Natural Engineer
Version 4.4.2
Application Documentation
for Windows

Manual Order Number: NEE442-022WIN

This document applies to Natural Engineer version 4.4.2 and to all subsequent releases.

Specifications contained herein are subject to change, and these changes will be reported in subsequent revisions or editions.

Readers' comments are welcomed. Comments may be addressed to the Documentation Department at the address on the back cover. Internet users may send comments to the following e-mail address:

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Acknowledgements

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ABOUT THIS MANUAL

Purpose of this manual

This manual contains the Application Documentation for Natural Engineer.

It describes the various processes available that enable you to review your Natural applications within Natural Engineer.

The topics cover the Application options found under the Environment menu, which include:

- Field level interrogation using the Field Explorer option.
- Object Level interrogation using the Object Explorer options.
- Object quality, reliability and maintenance interrogation using the Application Metrics options.
- An overview of the Object Quality reports available.

Target Audience

The target audience for this manual is intended to be any User of Natural Engineer at any level of experience.

Typographical Conventions used in this manual

The following conventions are used throughout this manual:

UPPERCASE TIMES	Commands, statements, names of programs and utilities referred to in text paragraphs appear in normal (Times) uppercase.
UPPERCASE BOLD COURIER	In illustrations or examples of commands, items in uppercase bold courier must be typed in as they appear.
< >	Items in angled brackets are placeholders for user-supplied information. For example, if asked to enter <file number>, you must type the number of the required file.
Underlined	Underlined parts of text are hyperlinks to other parts within the online source manual. This manual was written in MS-Word 97 using the "hyperlink" feature.

The following symbols are used for instructions:

⇒	Marks the beginning of an instruction set.
❑	Indicates that the instruction set consists of a single step.
1.	Indicates the first of a number of steps.

How this manual is organized

This manual is organized to reflect all the Application Documentation options of Natural Engineer in the following chapters:

Chapter	Contents
1	Describes the Field Explorer option, which provides the facility to review objects within applications loaded into the Repository at field level. This allows you to see the use of a field across the whole application as well as its use between objects.
2	Describes the various Object Explorer options, which provide the facility to review objects within each application loaded into the Repository at object level. The Object Explorer options review the inventory, structures, relationships, objects and source code within an application.
3	Describes the various Application Metrics options, which provide summary and detailed information about the application, objects and source code, for the purpose of providing structural statistics, quality and reliability information.

Terminology

It is assumed that you are familiar with general Natural and mainframe terminology, as well as the terms and concepts relating to Microsoft Windows operating systems. This section explains some terms that are specific to the Natural Engineer product.

Analysis

The Analysis process of Natural Engineer searches application data within the Natural Engineer Repository, according to specified Search Criteria and generates reports on the search results.

Application

An Application is a library or group of related libraries, which define a complete Application. In Natural Engineer, the Application can have a one-to-one relationship with a single library of the same name, or a library of a different name, as well as related steplibs. The Application refers to all the source code from these libraries, which Natural Engineer loads into the Repository.

Browser

An Internet Browser such as Microsoft Internet Explorer or Netscape.

Category

Categories in Natural Engineer specify whether and how a Modification is applied to the Natural code. Valid categories are: Automatic change, Manual change, Reject the default Modification, No change to the data item, and the data item is in Generated Code.

A category is further broken down according to type of change (for example: Keyword, Literal, Data Item, Database Access, Definition).

Consistency

An option in the Analysis process that causes Natural Engineer to trace an Impact through the code, using left and right argument resolution to identify further code impacted by the code found.

Environment

The Environment process is the means by which Natural Engineer generates a structured view of the application code in the Natural Engineer Repository. This provides application analysis reports and inventory information on the application and is used as the basis for Impact Analysis.

Exception

An Exception is an Item identified as impacted that does not require a Modification. Where there are a few similar Exception Items, they can be treated as Exceptions, and rejected in the Modification review process. Where there are many similar (therefore not Exceptions), consideration should be given to changing the Search Criteria so they are not identified as impacted in the first place.

Generated Code

This is code which has been generated by a Natural code generator, such as Construct, and which is not normally modified directly in the Natural editor.

Impact

An Impact is an instance of a Natural code Item; e.g., data item or statement (a “hit” scored by the Analysis process) that matches the defined Search Criteria used in the Analysis process.

Iteration

An Iteration is one examination cycle of a field identified according to the specified Search Criteria. For example, one Iteration is reading the field right to left. Multiple Iterations are performed when the option of ‘Consistency’ or Multi Search is requested for Analysis, and Natural Engineer performs as many Iterations as necessary to exhaust all possibilities of expressing and tracing the field, and can be limited by a setting in the NATENG.INI file.

Library

A single library of source code, which exists in the Natural system file.

Modification

A Modification is a change suggested or made to an object or data item resulting in the required compliance of that object or data item. Modifications in Natural Engineer are classified according to Category and Type.

Presentation Split Process

The Presentation Split Process is a sub-function of the Object Builder function that removes screen I/O statements from current application objects and places them in generated subprograms.

Soft Link

A Soft Link is where a link between two objects has been defined using an alphanumeric variable rather than a literal constant.

Technical Split Process

The Technical Split Process is a sub-function of the Object Builder function that results in the encapsulation of each database access within the application, into a sub-program so that the application is separated into 'presentation and logic' and 'database access'.

Type

The Type of Modification available, for example: Data Item, Keyword and Literal.

TLM

Text Logic Members are used to contain the code required to support inclusion of common code into the application. An example of this is the code to include into an application before updating a database.

Related Literature

The complete set of Natural Engineer manuals consists of:

1 **Natural Engineer Concepts and Facilities (NEE442-006ALL)**

The Concepts and Facilities manual describes the many application systems problems and solutions offered by Natural Engineer, providing some guidelines and usage that can be applied to Natural applications.

2 **Natural Engineer Release Notes (NEE442-008ALL)**

The Release Notes describe all the information relating to the new features, upgrades to existing functions and documentation updates that have been applied to Natural Engineer.

3 **Natural Engineer Installation Guide (NEE442-010ALL)**

The Installation Guide provides information on how to install Natural Engineer on both PC and mainframe platforms.

4 **Natural Engineer Administration Guide (NEE442-040WIN)**
Natural Engineer Administration Guide (NEE442-040MFR)

The Administration Guide provides information on all the various control settings available to control the usage of the different functions within Natural Engineer.

5 **Natural Engineer Application Management (NEE442-020WIN)**
Natural Engineer Application Management (NEE442-020MFR)

The Application Management manual describes all the functions required to add Natural applications into the Repository.

6 **Natural Engineer Application Documentation (NEE442-022WIN)**
Natural Engineer Application Documentation (NEE442-022MFR)

The Application Documentation manual describes all the available functions to document a Natural application within the Repository. These functions will help enhance / supplement any existing systems documentation such as BSD / CSD / Specifications etc.

7 **Natural Engineer Application Analysis and Modification (NEE442-023WIN)**
Natural Engineer Application Analysis and Modification (NEE442-023MFR)

The Application Analysis and Modification manual describes all the available functions to carry out analysis of Natural applications; including basic keyword searches. The modification process is described and detailed to show how it can be applied to modify single selected objects within a Natural application, or the entire Natural application in one single execution.

8 Natural Engineer Application Restructuring (NEE442-024WIN)
Natural Engineer Application Restructuring (NEE442-024MFR)

The Application Restructuring manual describes the analysis and modification functionality required to carryout some of the more sophisticated functions such as Object Builder.

9 Natural Engineer Utilities (NEE442-080WIN)
Natural Engineer Utilities (NEE442-080MFR)

The Utilities manual describes all the available utilities found within Natural Engineer and, when and how they should be used.

10 Natural Engineer Reporting (NEE442-025ALL)

The Reporting manual describes each of the reports available in detail, providing report layouts, how to trigger the report and when the report data becomes available. The various report-producing mediums within Natural Engineer are also described.

11 Natural Engineer Batch Processing [Mainframes] (NEE442-026MFR)

The Batch Processing manual describes the various batch jobs (JCL) and their functionality.

12 Natural Engineer WebStar (NWS442-020ALL)

The WebStar manual describes the concepts and facilities, installation and configuration options, how to web enable a Natural application and how to create and execute Natural Short Transactions using the Natural Engineer add-on component WebStar.

13 Natural Engineer WebStar Release Notes (NWS442-008ALL)

The Release Notes describe all the information relating to the new features, upgrades to existing functions and documentation updates that have been applied to the Natural Engineer add-on component WebStar.

14 Natural Engineer Messages and Codes (NEE442-060ALL)

The Messages and Codes manual describes the various messages and codes produced by Natural Engineer.

1

FIELD EXPLORER

Chapter Overview

This chapter describes the Field Explorer options available from the Environment menu.

Field Explorer provides the facility to review the applications loaded into the Repository at field level. This allows you to see the use of a field across the whole application as well as its use between objects.

The topics covered in this chapter:

1. Field Viewer.

Note: Natural Engineer refers to fields as data items or elements. Each of these are interchangeable terms for the same meaning, i.e., a field is a data item is an element.

Field Viewer

The Field Viewer option allows you to select and review information for individual data items within an object.

The information is presented on screen and GenTree is utilized to provide a diagrammatic view of the field usage with the added productivity of the its' own review options.

Field Explorer is accessed by using the following menu navigation: Environment➔Field Explorer➔Field Viewer.

Field Viewer Window

The data items within an application that has been loaded into the Repository are listed in a selection box. If you select a data item, a list of the objects referencing the selected data item is displayed. If you select one of the objects, then all the usage details for the selected data item within the object are displayed in the bottom half of the dialog box.

When you select a data item, GenTree Structure Analyzer will display the object(s) referencing the data item in pictorial format.

Note: For more information on GenTree Structure Analyzer refer to Chapter 2 in the Natural Engineer Reporting manual.

The following Figure 1-1 illustrates the Field Viewer screen.

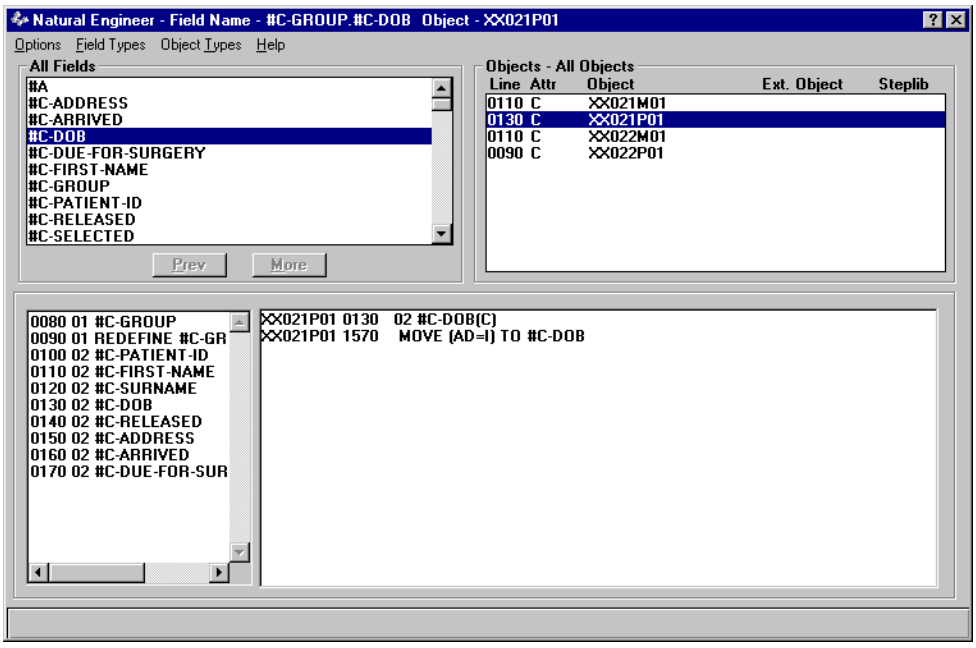


Figure 1-1 Field Viewer screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various screen display options.	
	Change Start Position of Element List	Allows the Element List to be restarted from a particular data item.
	View Source Code	Allows display of the source code of the selected object using the preferred browser.
	Edit Object	Allows the selected object to be opened in the appropriate Natural Editor.
	Close	Will close the Field Viewer screen and return you back to the main Natural Engineer screen.

MENU ITEMS	OPTIONS	DESCRIPTION
Field Types	Allows you to select the types of fields to be listed. Available selections are: ▪ **All Fields** ▪ **Non-Database Fields** ▪ **Database Fields** ▪ **System Variables**	
Object Types	Allows you to select the Object Types to be listed. Available selections are: ▪ **All Objects** ▪ **Programs** ▪ **Maps** ▪ **Data Defn. Modules** ▪ **Parameter Data Areas** ▪ **Global Data Areas** ▪ **Local Data Areas** ▪ **Copycodes** ▪ **Subprograms** ▪ **Subroutines** ▪ **Helproutines** ▪ **Dialogs** ▪ **Classes**	
Help	Invokes the Field Viewer help.	

SCREEN ITEMS	DESCRIPTION
Elements	Lists all the data items within the application that has been loaded into the Repository. This list can be repositioned by using the Change Start Position of Element List option from the Options menu.
Objects	This list box will show all the objects referencing the selected data item. It is possible to navigate between the Field Viewer screen and the Object Viewer, Object Documentation or User Documentation screens by using the **right hand mouse button** on a selected object. **Line** The Natural line number for the data item within the selected object. **Attr** The Format and Length of the data item. **Object** The name of the object referencing the selected data item. **Ext. Object** The name of the object that contains the definition, if the data item is defined externally, such as in a GDA or an LDA.

SCREEN ITEMS	DESCRIPTION
	Steplib The steplib library name of the object. Only applicable if the object referencing the data item is on a steplib library.
Element Context	This section shows the context of the element within the data definitions of the selected object. Details are only displayed when an object from the Objects list box has been selected.
Object Details	This section will show all the references of the selected data item for the selected object. Details are only displayed when an object from the Objects list box has been selected.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the element list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the element list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Field Viewer: GenTree Structure Analyzer

For each selected data item, GenTree displays the objects referencing that data item in a structural diagram. The objects listed will match the objects in the objects list box on the Field Viewer screen.

From the diagram, it is possible to view the source code, preview the map (map objects only), data definitions and object properties by using the right hand mouse button over each object in the diagram.

Note: For more information on GenTree Structure Analyzer refer to Chapter 2 in the Natural Engineer Reporting manual.

The following Figure 1-2 illustrates a sample GenTree Structure Analyzer diagram for Field Viewer.

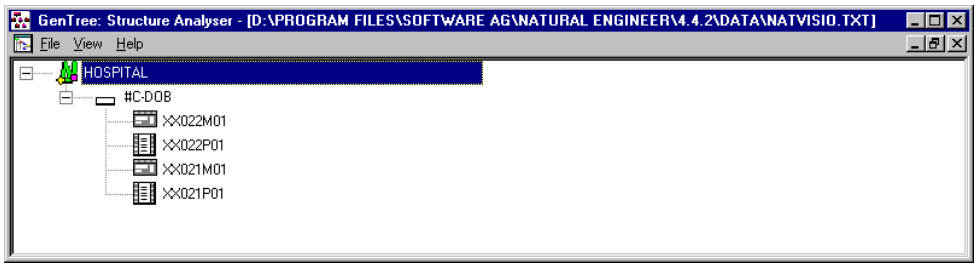


Figure 1-2 Sample GenTree Structure Analyzer diagram for Field Viewer

2

OBJECT EXPLORER

Chapter Overview

This chapter describes the Object Explorer options available from the Environment menu.

Object Explorer provides the facility to review the applications loaded into the Repository at object level.

The Object Explorer option is accessed using the following menu navigation: Environment➔Object Explorer.

The Object Explorer option provides a sub menu of facilities for the user to review the inventory, structures, relationships, objects and source code loaded into the Repository.

The topics covered in this chapter:

1. Object Viewer
2. Object Reference
3. Object Documentation
4. Entry Point Structure Diagram
5. Structure Flow Diagram
6. Program Flow Logic Diagram

Object Viewer

The Object Viewer option allows you to select and review information for individual objects. Information will be displayed to show the data items within the object and the statements using those data items.

Object Viewer Window

The Object Viewer window is accessed using the following menu navigation: Environment➔Object Explorer➔Object Viewer.

The objects that are loaded in the Repository are listed in a selection box.

If you select an object, a list of the data items appears.

If you select a data item, its details are displayed in the bottom half of the dialog box, and GenTree Structure Analyzer will display the object structures.

Note: For more information on GenTree Structure Analyzer refer to Chapter 2 in the Natural Engineer Reporting manual.

The following Figure 2-1 illustrates the Object Viewer screen.

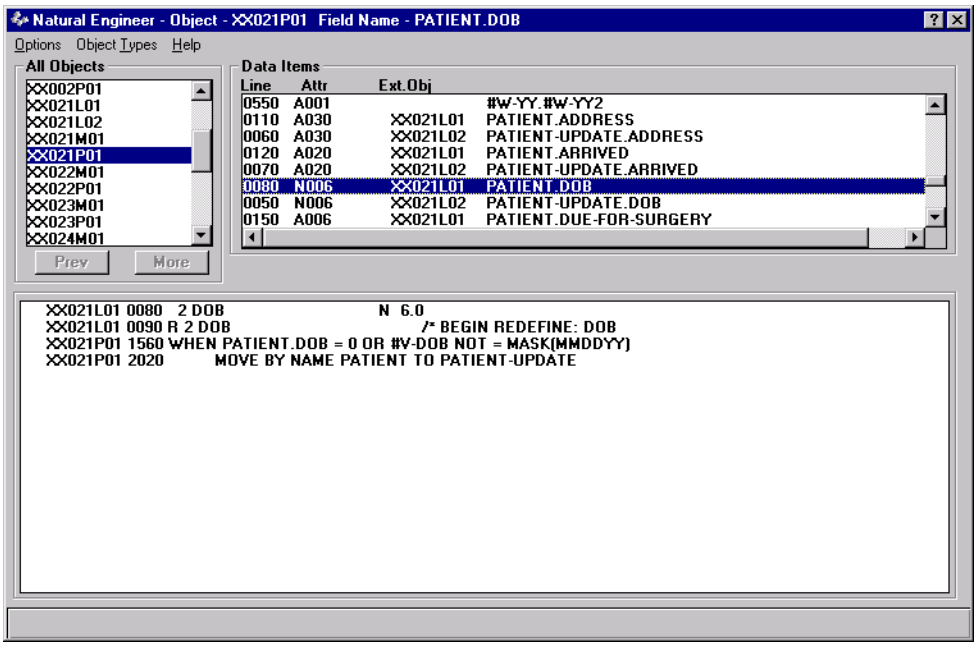


Figure 2-1 Object Viewer screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various screen display options.	
	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	View Source Code	Allows display of the source code of the selected object using the preferred browser.
	Edit Object	Allows the selected object to be opened in the appropriate Natural Editor.
	Close	Will close the Object Viewer screen and return you back to the main Natural Engineer screen.

MENU ITEMS	OPTIONS	DESCRIPTION
Object Types	Allows you to select the Object Types to be listed. Available selections are: ▪ **All objects** ▪ **Programs** ▪ **Maps** ▪ **Data Defn. Modules** ▪ **Parameter Data Areas** ▪ **Global Data Areas** ▪ **Local Data Areas** ▪ **Copycodes** ▪ **Subprograms** ▪ **Subroutines** ▪ **Helproutines** ▪ **Dialogs** ▪ **Classes**	
Help	Invokes the Object Viewer help.	

SCREEN ITEMS	DESCRIPTION
All Objects	Lists all the objects in the application that have been loaded into the Repository. This list can be tailored to your requirements using the options in the Object Types menu. It is possible to navigate between the Object Viewer screen and the Object Reference, Object Documentation or User Documentation screens by using the **right hand mouse button** on a selected object.
Data Items	This detail box will show all the data items for the selected object. It is possible to navigate between the Object Viewer screen and the Field Viewer screen by using the **right hand mouse button** on a selected data item. The columns available are: **Line** — The Natural line number for the data item within the selected object. **Attr.** — The Format and Length of the data item. **Ext. Object** — The name of the object that contains the definition if the data item is defined externally, such as in a GDA or an LDA. The data item name is shown after the Ext. Object column.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the element list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the element list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

The box at the bottom of the screen contains details of all uses of the data item selected, including the object, the line number and the line of code. This is invoked by selecting a data item from the list.

It is possible to invoke the Manual Source Code Changes screen by selecting any one of the statement lines displayed in this box.

Manual Source Code Changes

This option allows changes to source lines within an object to be made and stores the changed details on the Repository. These manual source code changes will then be identified during Impact Analysis execution. The actual implementation of the manual source code change can then be applied using the modification option.

Note: Manual source code changes do not get applied to the Natural source code of the selected object at this stage. They are only stored on the Repository.

The following Figure 2-2 illustrates the Manual Source Code Changes screen.

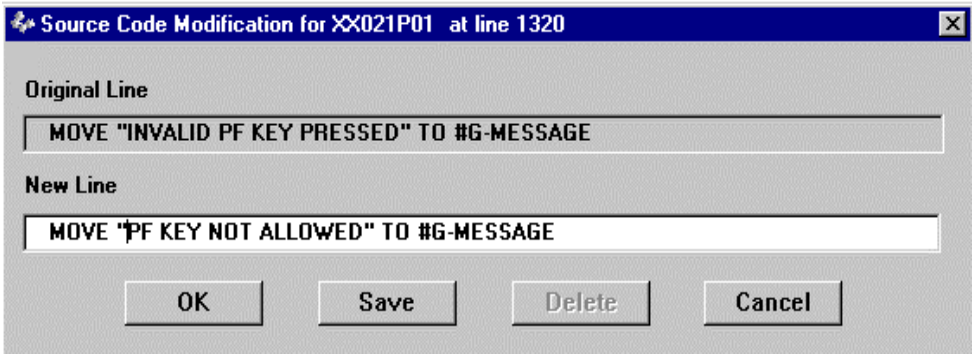


Figure 2-2 Manual Source Code Changes screen

SCREEN ITEMS	DESCRIPTION
Original Line	This shows the original source code line.
New Line	This is an input box, which allows you to enter the new code details. For Example: **MOVE "INVALID PF KEY PRESSED" TO #G-MESSAGE** has been changed to: **MOVE "PF KEY NOT ALLOWED" TO #G-MESSAGE**

BUTTON NAME	DESCRIPTION
OK	Will return back to the Object Viewer screen. This will not save any New Line details.
Save	Saves the New Line details to the Repository.
Delete	Will delete any New Line details for the selected line only.
Cancel	Will close the Manual Source Code Changes screen and return back to the Object Viewer screen.

When a manual source code change has been applied to a code line, the Object Viewer screen will show its presence by placing an 'X' at the start of the displayed statement lines in the box at the bottom of the Object Viewer screen.

The following Figure 2-3 illustrates the Object Viewer screen showing manual source code changes present.

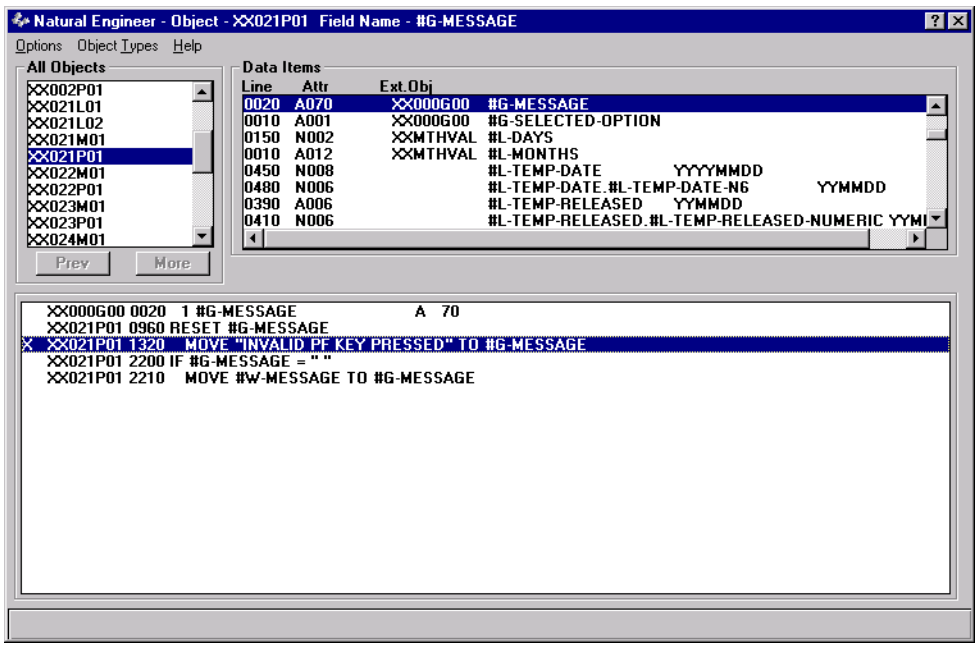


Figure 2-3 Object Viewer screen showing manual source code changes present

When they are being viewed, any statement lines with manual source code changes attached to them will get displayed with an ‘X’ in front of them. These can then be selected with the left-hand mouse button to show the manual source code changes screen.

Note: It is possible to view the same manual source code changes on the Impact Element Maintenance and the Modification Element Maintenance screens.

Object Viewer: GenTree Structure Analyzer

For DDMs, GenTree will display all the objects that reference the selected DDM and list the type of access being made (e.g., READ, DELETE, STORE).

Note: A DDM (data definition module) is a set of field definitions for a database file. A DDM can be created from a database file or from other DDMs. DDMs are used to describe any type of database file, and are not restricted to Adabas database files.

For all other objects, GenTree displays the information on external references within the object selected, including data areas, include code, maps, Natural interfaces and subprograms.

Note: For more information on GenTree Structure Analyzer refer to Chapter 2 in the Natural Engineer Reporting manual.

The following Figure 2-4 illustrates a sample GenTree Structure Analyzer diagram for Object Viewer.

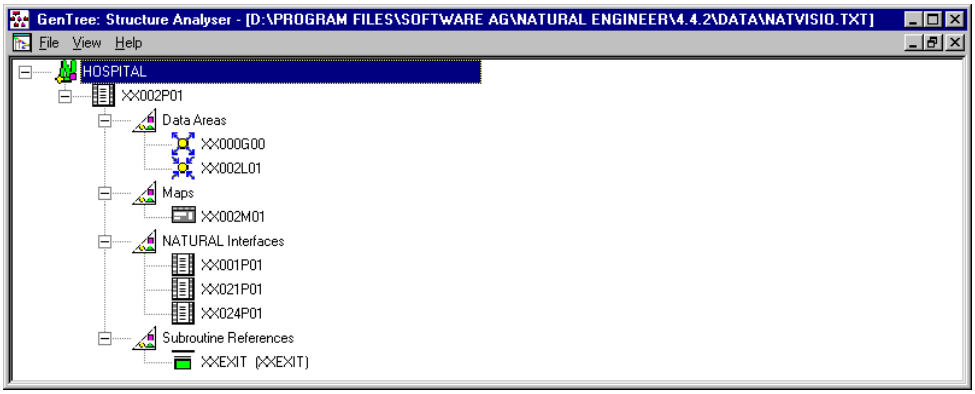


Figure 2-4 Sample GenTree Structure Analyzer diagram for Object Viewer

Object Reference

The Object Reference option allows you to review the relationships between objects, both those used by the object and those using the object.

Object Reference Window

The Object Viewer window is accessed using the following menu navigation: Environment➔Object Explorer➔Object Reference.

The objects that are loaded into the Repository are listed in the selection box. If you select an object, a list of referenced objects appears in the right-hand list box.

The following Figure 2-5 illustrates the Object Reference screen.

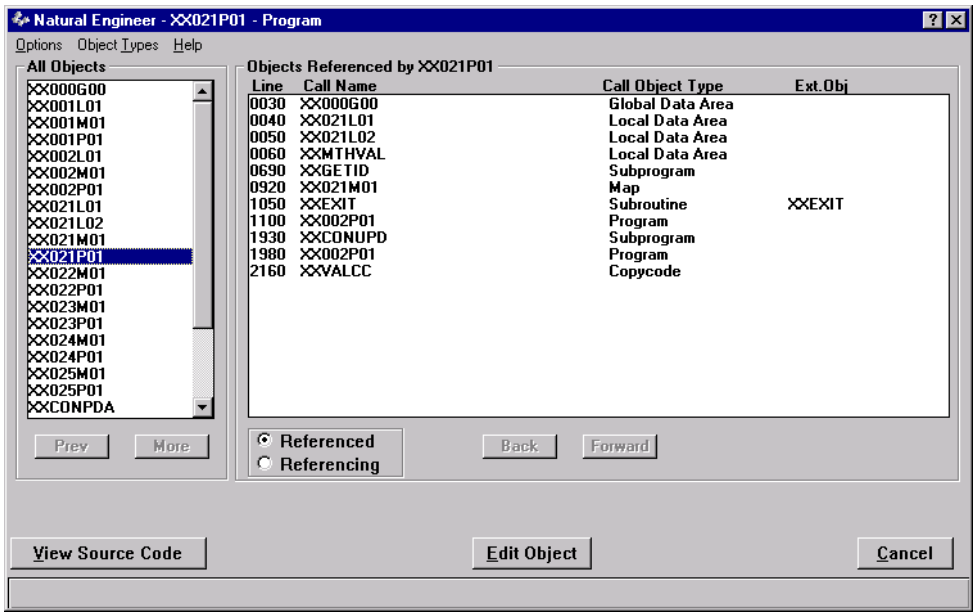


Figure 2-5 Object Reference screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various report refinement options.	
	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	Close	Will close the Object Reference screen and return you back to the main Natural Engineer screen.
Object Types	Allows you to select the Object Types to be listed. Available selections are: ▪ **All objects** ▪ **Programs** ▪ **Maps** ▪ **Parameter Data Areas** ▪ **Global Data Areas** ▪ **Local Data Areas** ▪ **Copycodes** ▪ **Subprograms** ▪ **Subroutines** ▪ **Helproutines** ▪ **Dialogs** ▪ **Classes**	
Help	Invokes the Object Reference help.	

SCREEN ITEMS	DESCRIPTION	
All Objects	Lists all the objects in the application that have been loaded into the Repository. This list can be tailored to your requirements using the options in the Object Types menu. It is possible to navigate between the Object Reference screen and the Object Viewer, Object Documentation or User Documentation screens by using the **right hand mouse button** on a selected object.	
Objects Referencing / Objects Referenced by	This detail box will show all the relevant reference information for the selected object. The heading is controlled by the selection of the radio buttons described below. It is possible to select an object from this list to see the relevant reference information for that object. The columns available to both options are:	
	Line	The Natural line number for the referenced/referencing object.
	Call Name	The name of the object referenced by/referencing the call.
	Call Object Type	The type of Natural object referenced/referencing.
	Ext. Object	If the call name is contained in another physical object then the name of that object is also listed. For example, the PERFORM statement can have a name up to 32 bytes long and the code can exist in an external object that has a name of only 8 bytes, i.e., a Natural programming object in its own right.
Radio Buttons	**Referenced**	This option will show all objects that use the selected object.
	Referencing	This option will show all the external objects used by the selected object.
	Note: For an example of the relationship between these two options see the section Referenced Vs Referencing later in this chapter.	

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
Back	Scrolls the object reference details to previous page. This button will be available/unavailable depending on whether sufficient data is available.
Forward	Scrolls the object reference details forward one page. This button will be available/unavailable depending on whether sufficient data is available.
View Source Code	Allows display of the source code of the selected object using the preferred browser.
Edit Object	Allows the selected object to be opened in the appropriate Natural Editor.
Cancel	Will close the Object Reference screen and return you back to the main Natural Engineer screen.

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Referenced Vs Referencing

The Object Reference screen will show for a selected object, all the external objects that it references. For example, any includes of data areas, calls to other programs/subprograms or performs of external subroutines.

By using the radio buttons ‘Referenced’ and ‘Referencing’ it is possible to flip between the type of relationship being displayed for the selected object.

Example of Referenced Vs Referencing

On the Object Viewer screen, object XX023P01 from the sample application HOSPITAL is selected.

If the Referenced radio button is on, then the Objects Referenced by list box will display objects: XX000G00, XX021L01, XX023M01 and XXEXIT. This information is showing that within the code for XX023P01, it is making a reference to each of these objects.

Sample code from object XX023P01:

```
0020 *
0030 DEFINE DATA GLOBAL USING XX000G00
0040 LOCAL USING XX021L01
::::
0330 *
0340 INPUT USING MAP "XX023M01"
::::
0400     PERFORM XXEXIT
```

The following Figure 2-6 illustrates the Referenced option for object XX023P01.

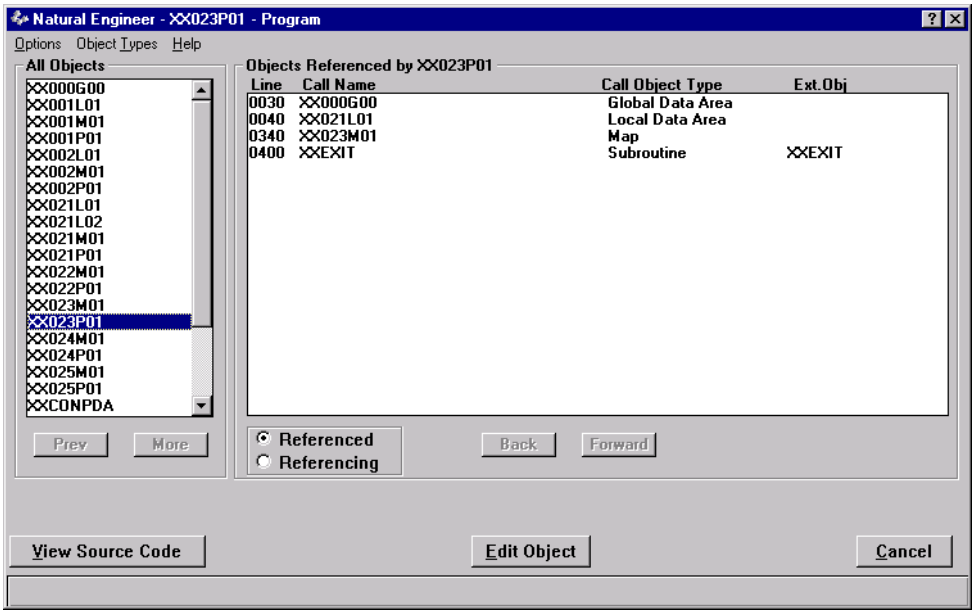


Figure 2-6 Referenced option for object XX023P01

If the Referencing radio button is activated, then the display will change to show the Objects Referencing list box with object: XX024P01 displayed. This information shows that only this one object in the sample application HOSPITAL contains code that references XX023P01.

Sample code from object XX024P01:

```
0250    VALUE "P"
0260        IF #M-YEAR = 0
0270           MOVE "YEAR MUST BE ENTERED FOR THE P OPTION" TO #G-MESSAGE
0280           MOVE 2 TO #W-MARK
0290           ESCAPE TOP
0300        END-IF
0310        STACK TOP DATA FORMATTED #M-YEAR
0320        FETCH RETURN "XX023P01"
```

The following Figure 2-7 illustrates the Referencing option for object XX023P01.

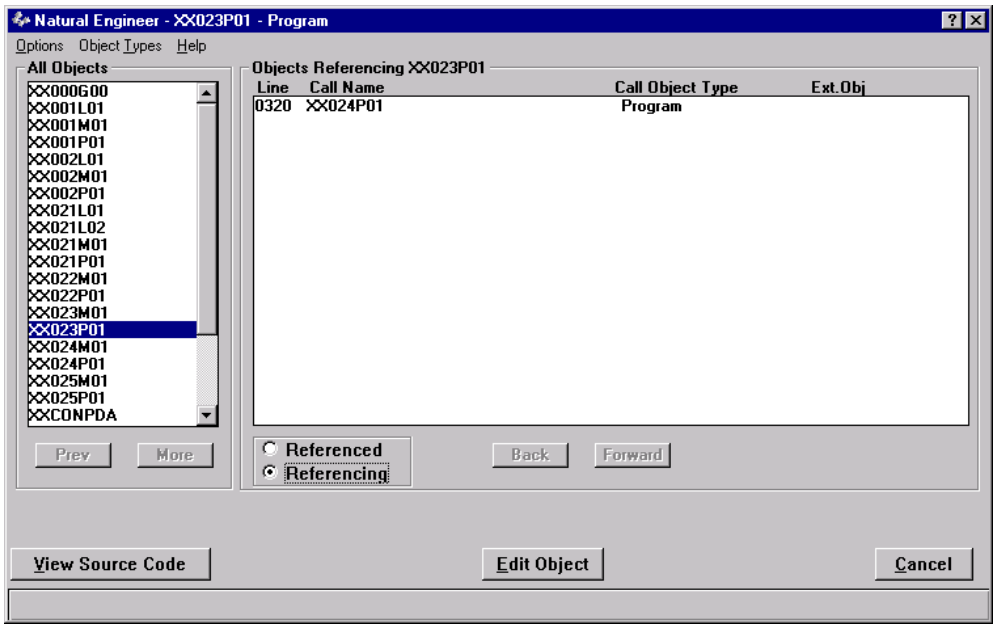


Figure 2-7 Referenced option in the Object Reference screen

Object Documentation

The Object Documentation option allows you to view a concise overview of the major characteristics of an object.

Object Documentation Window

The Object Documentation window is accessed using the following menu navigation: Environment➔Object Explorer➔Object Documentation.

The objects that are loaded into the Repository for applications are available for selection from the Objects list box. Once an object is selected, the characteristics are displayed online. It is possible to view the details using Reporter, HTML (browser), Excel or Word, where the object documentation can be obtained in hardcopy format.

The following Figure 2-8 illustrates the Object Documentation screen.

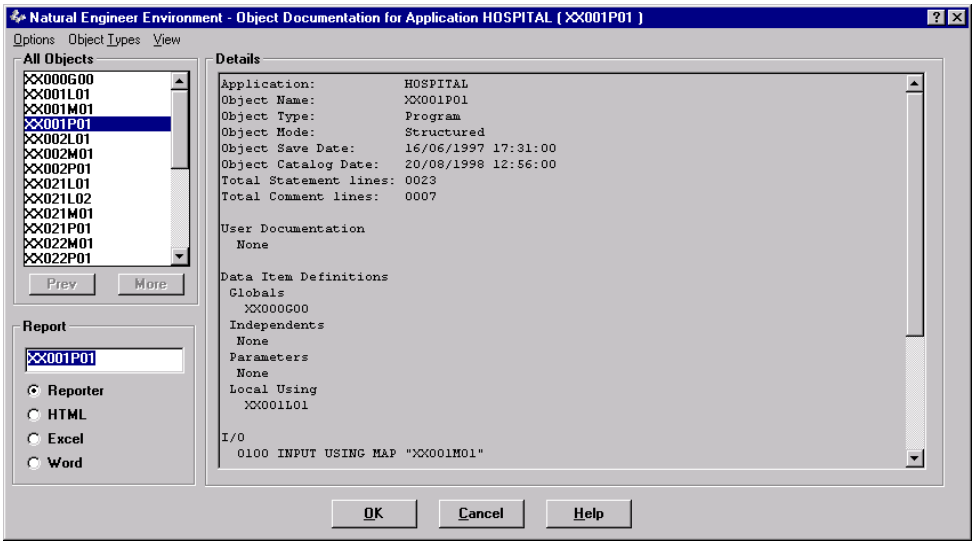


Figure 2-8 Object Documentation screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various report refinement options.	
	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	View Source Code	Allows display of the source code of the selected object using the preferred browser.
	Edit Object	Allows the selected object to be opened in the appropriate Natural Editor.
	Close	Will close the Object Documentation screen and return you back to the main Natural Engineer screen.
Object Types	Allows you to select the Object Types to be listed. Available selections are: ▪ **All objects** ▪ **Programs** ▪ **Maps** ▪ **Parameter Data Areas** ▪ **Global Data Areas** ▪ **Local Data Areas** ▪ **Copycodes** ▪ **Subprograms** ▪ **Subroutines** ▪ **Helproutines** ▪ **Dialogs** ▪ **Classes**	
View	Allows you to select, which sections are to be displayed in the reports. Sections that are displayed are indicated by a 'tick' mark. There are some system defaults which will override any user selection:- 1. Header Details are always shown. 2. Data Area and Text objects will show header details only. 3. Processing Rules will be shown on Map objects only. 4. Construct Details will be shown for objects generated using Natural Construct only. Sections available are: -	
	Section	**Description**
	User Documentation	User specified comments for an object created via the User Documentation option. *Note: For more information on the User Documentation option, refer to Chapter 3 in the Natural Engineer Application Management for Windows manual.*

MENU ITEMS	OPTIONS	DESCRIPTION
	Data Item Definitions	Globals; Independents; Parameters and Locals
	I/O	All input and output type statements.
	Database Access	All statements related to database access.
	External Calls	Any statements that result in processing to be invoked in objects outside the current object.
	Internal Subroutines	Any statements that invoke internal subroutines within an object.
	Processing Rules	Processing rules within a map.
	Construct Details	Any Construct Model and User Exit details.

SCREEN ITEMS	DESCRIPTION
Objects	Lists all the objects in the application that have been loaded into the Repository. This list can be tailored to your requirements using the options in the Object Types menu. It is possible to navigate between the Object Documentation screen and the Object Viewer, Object Reference or User Documentation screens by using the **right hand mouse button** on a selected object.

SCREEN ITEMS	DESCRIPTION
Details	This will show the object characteristics for the selected object. The details shown are: **Object header details:** ▪ Application. ▪ Object Name. ▪ Object Type. ▪ Object Mode. ▪ Object Save Date. ▪ Object Catalog Date. ▪ Total Statement Lines. ▪ Total Comment Lines. ▪ Code Generated by: Construct. (only for Natural Construct objects) **Object characteristic details:** ▪ User Documentation - User specified comments for an object created via the User Documentation option. ▪ Data Item Definitions: Globals; Independents; Parameters and Locals ▪ I/O - all input and output type statements. ▪ Database Access - shows all the statements related to database access. ▪ External Calls - any statements that result in processing to be invoked in objects outside the current object. ▪ Internal Subroutines - any statements that invoke internal subroutines within an object. ▪ Processing Rules - any processing rules that may exist within a map. ▪ Construct Details - Any Construct Model and User Exit details. *Note: For more information on the User Documentation option, refer to Chapter 4 in the Natural Engineer Application Management for Windows manual.*

SCREEN ITEMS	DESCRIPTION	
Report Object Selection	This will be the object or range of objects that will get reported on. There are three valid cases allowed:	
	*****	Will produce Object Documentation reports for ALL objects in the current application.
	XX001*	Will produce Object Documentation reports for ALL objects that have a name prefixed with XX001. For the HOSPITAL system this would be XX001L01, XX001M01 and XX001P01.
	XX021P01	Will produce Object Documentation reports for object XX021P01 only.
Report Destination	**Reporter**	Will display the selected object details using Natural Reporter. Invoked by using **OK** button.
	HTML	Will display the selected object details using a browser. Invoked by using **OK** button.
	Excel	Will display the selected object details using Excel. Invoked by using **OK** button.
	Word	Will display the selected object details using Word. Invoked by using **OK** button.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
OK	Invokes the selected Report Destination.
Cancel	Exit the Object Documentation screen.
Help	Invokes the Object Documentation help.

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Object Characteristic Details Overview

The object characteristics that are displayed fall into three main categories:

1. User Documentation.

This section will always be shown for each object. It will detail any comments that have been specified using the User Documentation function in Natural Engineer. For Example:

User Documentation

Title: **XX001P01 – HOSPITAL system main menu**

Comments : **This program is the main executable for the HOSPITAL system. It will display the main menu showing the main functions available.**

Note: For more information on the User Documentation option, refer to Chapter 4 in the Natural Engineer Application Management for Windows manual.

2. Data Item Definition.

Globals	All external Global Data Area (GDA) objects used within the selected object will be listed. No individual global data items are shown. For Example: DEFINE DATA GLOBAL USING XX000G00. Would be displayed as: **Globals** **XX000G00**

Independents	All Application Independent Variables (AIV) will be shown. These will be the actual data items that have been defined using the INDEPENDENT clause. For Example: DEFINE DATA INDEPENDENT 01 +AIV-NAME (A25). Would be displayed as: **Independents** **+AIV-NAME**
Parameters	Both the external Parameter Data Area (PDA) objects and/or any internally defined parameter data items specified in an object under the PARAMETER clause. For Example: DEFINE DATA PARAMETER USING XXCONPDA PARAMETER 01 #EXTRA-PARM1 (A10). Would be displayed as: **Parameters** **XXCONPDA** **#EXTRA-PARM**
Local Using	All external Local Area (LDA) objects used within the selected object will be listed. No individual local data items are shown. For Example: DEFINE DATA LOCAL USING XX001L01. Would be displayed as: **Local Using** **XX001L01**

3. Object Procedural code details.

I/O	All input and output statements are reported. For Example: **I/O** **0020 INPUT #PARM-1 #PARM-2** **0100 INPUT USING MAP 'XX021M01'** **0190 REINPUT 'PLEASE ENTER A VALID ID'** **0330 WRITE 'FINANCIAL REPORT'** **0340 DISPLAY #EXPENDITURE 15T #TAX-VAL** **0590 PRINT 'END OF BATCH RUN'**
Database Access	All database access statements are reported. The order is by ascending statement line number within each view name. For Example: **Database Access** **EMP1 at 0520 by FIND (EMPLOYEES)** **EMP2 at 0990 by UPDATE (EMPLOYEES)** **VEH1 at 0700 by STORE (VEHICLES)** **VEH1 at 0740 by FIND (VEHICLES)** **VEH1 at 0810 by READ (VEHICLES)** **VEH1 at 0840 by GET (VEHICLES)**
External Calls	All references to external objects, such as programs, subprograms and subroutines. The order is by ascending statement line number within each external object. For Example: **External Calls** **XX002P01 by FETCH at 1100** **XX002P01 by FETCH at 1980** **XXCONUPD by CALLNAT at 1930** **XXEXIT by PERFORM at 1050** **XXGETID by CALLNAT at 0690** **XXVALCC by INCLUDE at 2160**

Internal Subroutines	Any references to internal subroutines within an object. The order is by ascending statement line number for each internal subroutine. For Example: **Internal Subroutines** **##DATE-FORMAT by PERFORM at 0550** **##DATE-FORMAT by PERFORM at 1020** **##TAX-CALC by PERFORM at 0700**
Processing Rules	Any processing rules found within maps. Both 'Free' and 'Automatic' rules are catered for. For Example: **Processing Rules** **Automatic Rule Rank 1 PERSONNEL-ID** **Automatic Rule Rank 1 BIRTH** **Free Rule Rank 0 *PF-KEY** **Free Rule Rank 0 #INPUT-NAME**
Construct Details	This section is only available for objects that have been generated using CONSTRUCT. It will show any Construct Model and User Exit information. For Example: **Construct Details** **Model: XX-BROWSE** **User Exit LOCAL-DATA from 0300 to 0500** **User Exit START-OF-PROGRAM from 0750 to 1000** **User Exit SET-PF-KEYS from 1995 to 2115**

Example Object Documentation Reports

This set of examples is to illustrate the Object Documentation reporting options. The program object XX002P01 from the sample application HOSPITAL will be used for each reporting option. The View menu options will all active, i.e., each option will be marked with a tick.

The example will show each of the Report display modes available to the Object Documentation option:

1. Object Documentation screen
2. Reporter
3. HTML
4. Excel
5. Word.

Object Documentation Screen

The following Figure 2-9 illustrates the Object Documentation details reported using the Object Documentation screen.

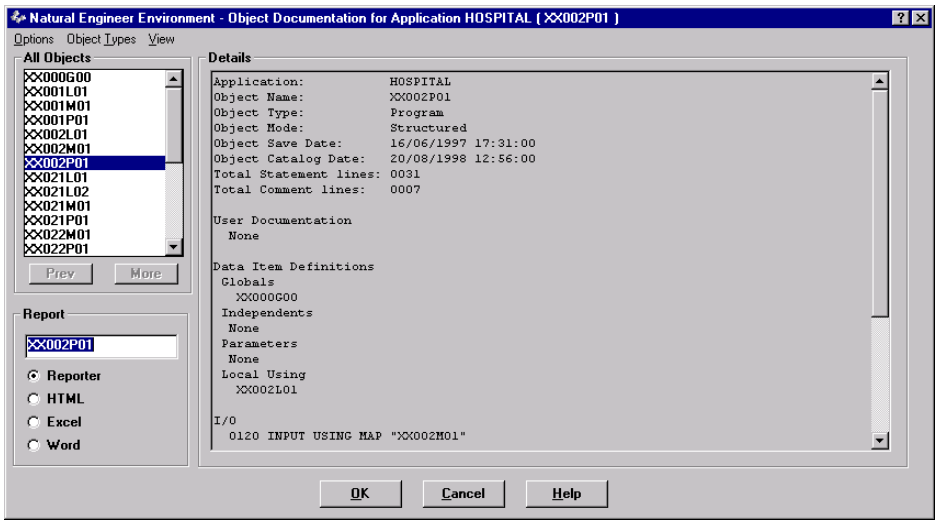
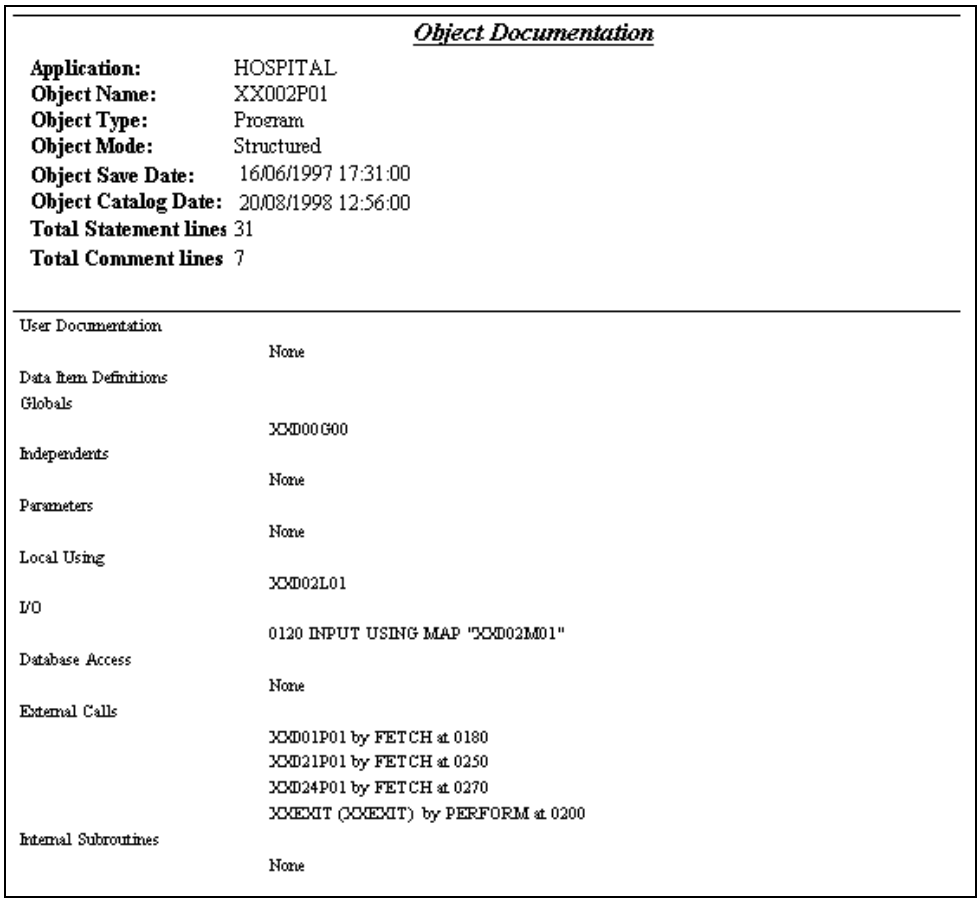


Figure 2-9 Object Documentation details using Object Documentation screen

Reporter

The following Figure 2-10 illustrates the Object Documentation details reported using the Natural Reporter option.



Object Documentation

Application: HOSPITAL
Object Name: XX002P01
Object Type: Program
Object Mode: Structured
Object Save Date: 16/06/1997 17:31:00
Object Catalog Date: 20/08/1998 12:56:00
Total Statement lines 31
Total Comment lines 7

User Documentation
None
Data Item Definitions
Globals
XXD00G00
Independents
None
Parameters
None
Local Using
XXD02L01
I/O
0120 INPUT USING MAP "XXD02M01"
Database Access
None
External Calls
XXD01P01 by FETCH at 0180
XXD21P01 by FETCH at 0250
XXD24P01 by FETCH at 0270
XXEXIT (XXEXIT) by PERFORM at 0200
Internal Subroutines
None

Figure 2-10 Object Documentation details using Natural Reporter option

HTML

The following Figure 2-11 illustrates the Object Documentation details reported using the HTML option.

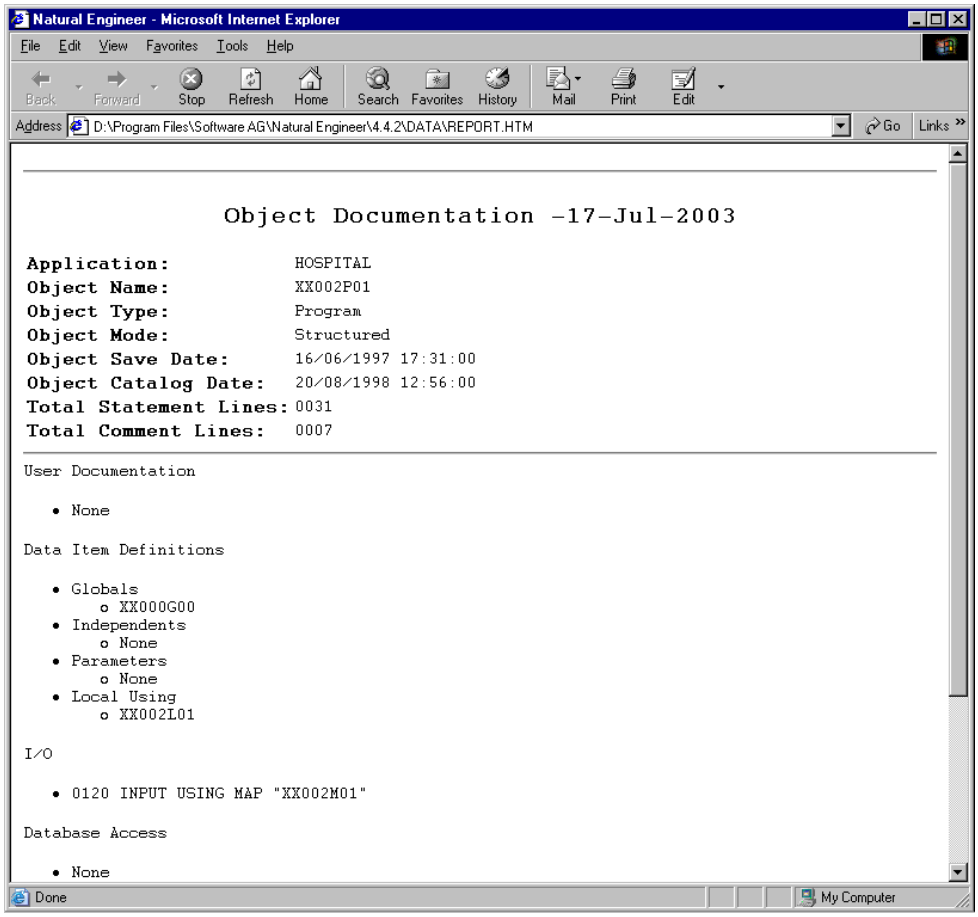


Figure 2-11 Object Documentation details using HTML option

Excel

The following Figure 2-12 illustrates the Object Documentation details reported using the Excel option.

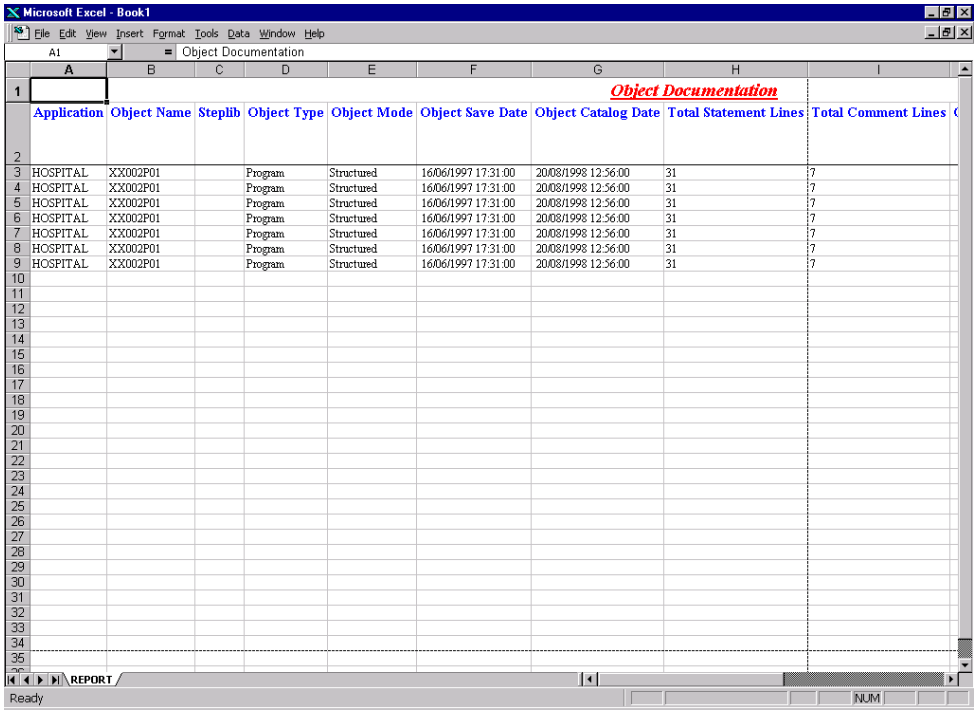


Figure 2-12 Object Documentation details using Excel option

Word

The following Figure 2-13 illustrates the Object Documentation details reported using the Word option.

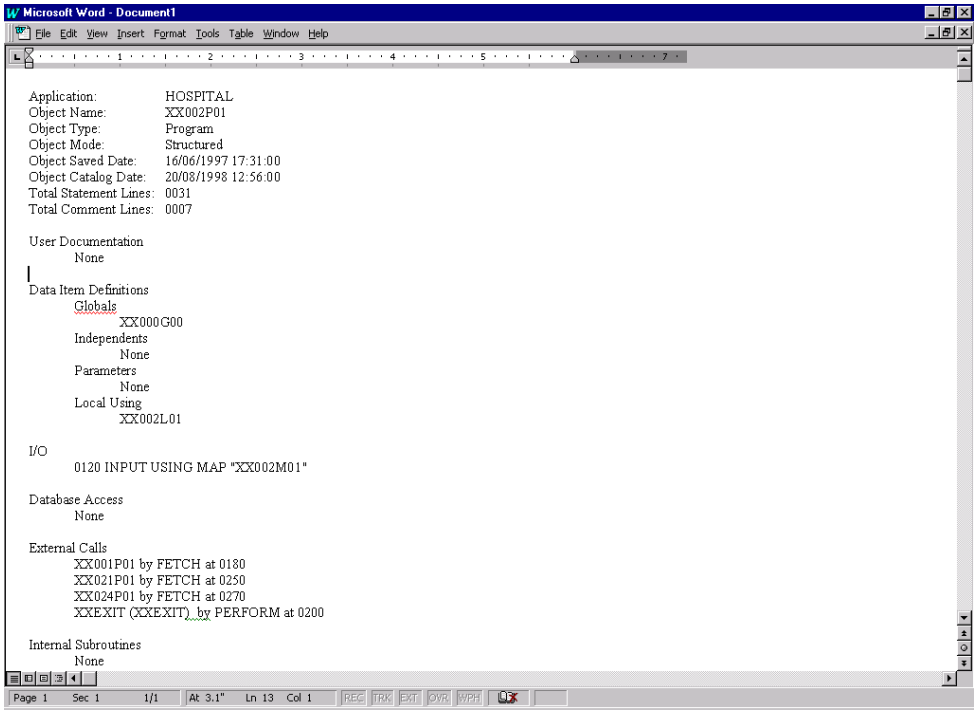


Figure 2-13 Object Documentation details using Word option

Entry Point Structure Diagram

The Entry Point Structure Diagram option will draw a structured diagram of an application using GenTree.

Note: For more information on GenTree refer to Chapter 2 in the Natural Engineer Reporting manual.

This diagram will provide a pictorial view of an application showing the various inter-object activity, adding value to existing systems documentation for both development and production support tasks.

The process is initiated by defining Entry Points into an application, or into a technical or business function within an application, for documentation purposes, that will then be graphed in a GenTree structure when executed.

The diagram starts with the entry point object and displays all other objects referenced by that object, and the objects referenced by those, and so on. Once an object has already been processed for an entry point and the same object is found within other entry point chains, then no further processing will be made for that object. The diagram will show the object name and be suffixed with a comment of '(Recursive)'.

Any missing objects (i.e., objects not loaded into the Repository) are shown in red with a suffix comment of '(Missing)'. Any objects that are from a steplib library are shown with a suffix comment of '(Steplib: "steplib library name")'.

It is possible to specify exclusions to prevent expansion of specified objects. Exclusions can be specified at object name and/or object type levels. Any object matching the exclusion criteria specified will be shown in red with a suffix comment of '(Excluded Object)' for object name exclusions, and '(Excluded Object Type)' for object type exclusions. Excluded objects will show no further entry point chains.

Further viewing refinements are available to limit the number of entry point chain levels displayed and whether exclusions are to be displayed or omitted from the diagram.

For each Entry Point Structure Diagram, a legend of the selected options used for the diagram is shown at the top.

Entry Points Window

The Entry Point Structure Diagram option is accessed using the following menu navigation: Environment➔Object Explorer➔Entry Point Structure Diagram.

When this option is selected, the Entry Points screen is displayed. This screen allows you to select the main entry points within an application.

The following Figure 2-14 illustrates the Entry Points screen.

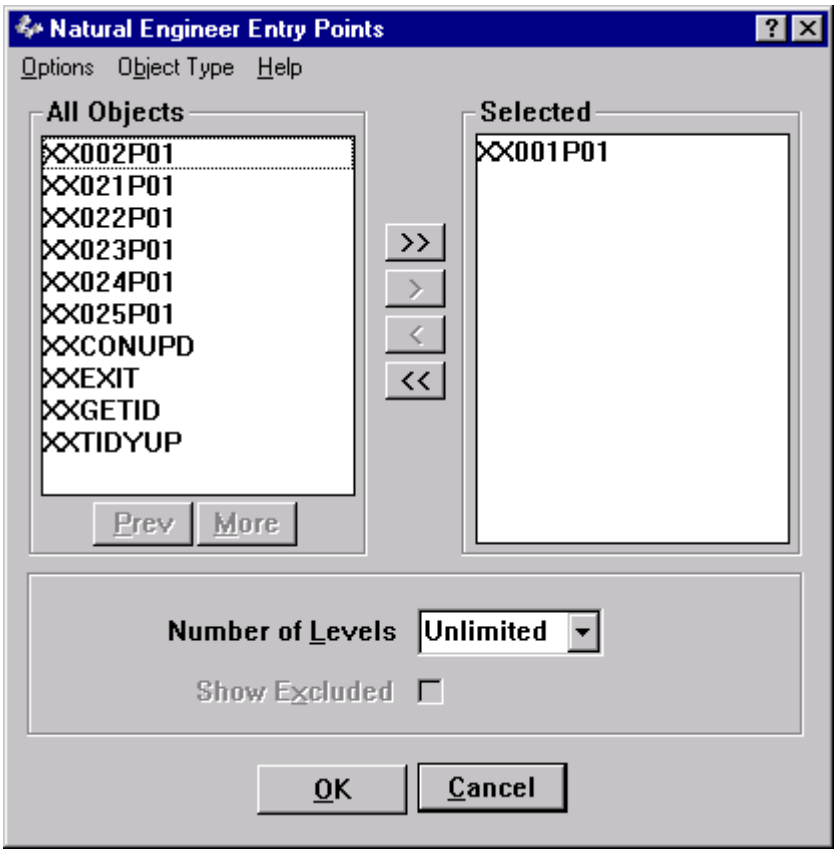


Figure 2-14 Entry Points screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various Entry Point handling options.	
	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	Entry Point Exclusions	This will invoke the Entry Point Exclusions screen.
	Exit	Will close the Entry Points screen and return you back to the main Natural Engineer screen.
Object Type	Allows you to select the object types to be listed. Valid object types are: ▪ **All Objects (default)** ▪ **Programs** ▪ **Subprograms** ▪ **Subroutines** ▪ **Dialogs**	
Help	Invokes the Entry Point Structure Diagram help.	

SCREEN ITEMS	DESCRIPTION
All Objects	Lists the objects in the application that have been loaded into the Repository. Only object types of Program, Subprogram, Subroutine and Dialog will be displayed. The title at the top of the objects list box is dependent on the setting for object types; the default is 'All Objects'. For example: If object type were set to programs, the title would be 'Programs'.
Selected	This will show the objects that have been selected as entry points. There is a maximum limit of 29 objects allowed.
Number of Levels	This will set the number of levels to be processed. Possible selections are: **Unlimited** Show all levels. **1-9** Restrict the number of levels to the value selected.

SCREEN ITEMS	DESCRIPTION
Show Excluded	Controls the display of Entry Point Structure Diagram exclusions. Valid selections in the check box are: '**Tick**' Will display the excluded object on the diagram but no further relationship chain information for that object will be displayed. The object will be marked as '(Excluded Object)' for object name exclusions, and '(Excluded Object Type)' for object type exclusions. ' ' The excluded object will not appear on the diagram. *Note: This option is only available if exclusions have been specified.*

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
>>	Select all objects on the current page in the object list. This will use the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
>	Select a single object from the object list.
<	De-select a single object from the 'Selected' list.
<<	De-select all objects from the 'Selected' list.
OK	Save the Entry Point selections and invoke the Entry Point Structure Diagram.
Cancel	Will close the Entry Points screen and return you back to the main Natural Engineer screen.

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Entry Point Exclusions

As well as specifying the entry points within an application, it is possible to specify any objects you do not wish to have graphed on the Entry Point Structure Diagram by using the Entry Point Exclusions screen.

This option allows you to tailor the diagrams to only show the relevant level of detail required. This prevents over crowded diagrams being produced when only a certain proportion of the system entry point chains is required.

Exclusions can be specified by object name and/or object type.

Object Name Exclusions

The Entry Point Exclusion screen allows up to a maximum of 10 objects to be excluded from the diagram. Object names can be entered in full or using wildcard masks to identify groups of objects. For example:

1. **Exclusion object name** = '**XX021P01**' would result in object XX021P01 having no entry point chain being displayed for it. The diagram would show 'XX021P01 (Excluded Object)' and be highlighted in red.
2. **Exclusion object name** = '**PRT***' would result in all objects where their name is prefixed with PRT, having no entry point chains displayed. The diagram would show the object name followed by the '(Excluded Object)' suffix and be highlighted in red.

Object Type Exclusions

Object type exclusions will exclude all objects for a selected object type. Selections are made using the Exclude Object Types drop-menu on the Entry Point Exclusions screen. For example:

If object type **Maps** has been selected, then any map objects found in the entry point chain will show the map object name followed by the '(Excluded Object Type)' suffix and be highlighted in red.

Note: Objects that are excluded can be displayed or omitted from the Entry Point Structure Diagram using the 'Show Excluded' option on the Entry Points screen. For more information refer to section Entry Points Window.

Entry Point Exclusions Window

The Entry Point Exclusions screen is accessed from the Options drop-menu on the Entry Points screen, using Options➔Entry Point Exclusions. When this option is selected, the Entry Point Exclusions screen is displayed.

The following Figure 2-15 illustrates the Entry Point Exclusions screen.

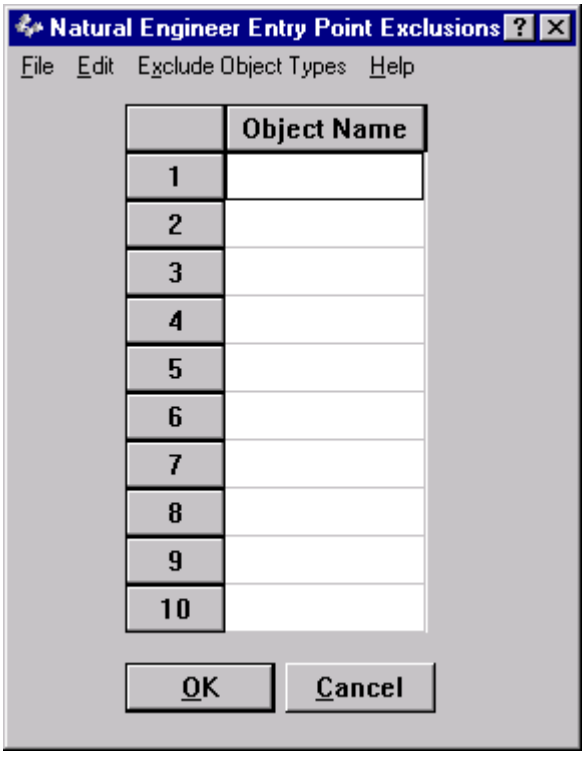


Figure 2-15 Entry Point Exclusions screen

MENU ITEMS	OPTIONS	DESCRIPTION
File	**Exit**	Will close the Entry Point Exclusion screen and return you back to the Entry Points screen.
Edit	**Delete Row**	Will delete the selected object name from the object exclusion list.
Exclude Object Types	Specify exclusions by object type. Possible selections are: • **Exclude None** • **Programs** • **Maps** • **Subprograms** • **Subroutines** • **Helproutines** • **Dialogs** • **Classes**	
Help	Invokes the Entry Point Structure Diagram Exclusions help.	

SCREEN ITEMS	DESCRIPTION	
Object Name	Objects to be marked for exclusion are specified here. Object names can be complete names or part names using a wildcard of '*' (asterisk). For example:	
	XX021P01	Will exclude object XX021P01.
	PRT*	Will exclude any objects whose name is prefixed with 'PRT'.

BUTTON NAME	DESCRIPTION
OK	Save the Entry Point Exclusion selections and return to the Entry Points screen.
Cancel	Will close the Entry Point Exclusions screen and return you back to the Entry Points screen.

Examples of Entry Point Structure Diagram

To illustrate the Entry Point Structure Diagram, two examples are shown using the sample Natural application HOSPITAL. These examples will illustrate the Entry Point Structure Diagram as it appears using the GenTree Structure Analyzer window.

Note: For more information on the GenTree Structure Analyzer window refer to Chapter 2 in the Natural Engineer Reporting manual.

The two examples available are:

1. Simple Entry Point for the HOSPITAL application.
2. Add Entry Point Exclusions to the HOSPITAL application.

Example 1: Simple Entry Point for the HOSPITAL Application.

This example will run through the steps required to produce the Entry Point Structure Diagram for the sample Natural application HOSPITAL. The Entry Point will be set to XX001P01, which is the main menu program for the Hospital application.

Step 1 Open the Entry Point Structure Diagram option.

From the main Natural Engineer screen open the Entry Point Structure Diagram option by selecting menu Environment➔Object Viewer➔Entry Point Structure Diagram. The Entry Points screen will be presented.

The following Figure 2-16 illustrates the Entry Points screen.

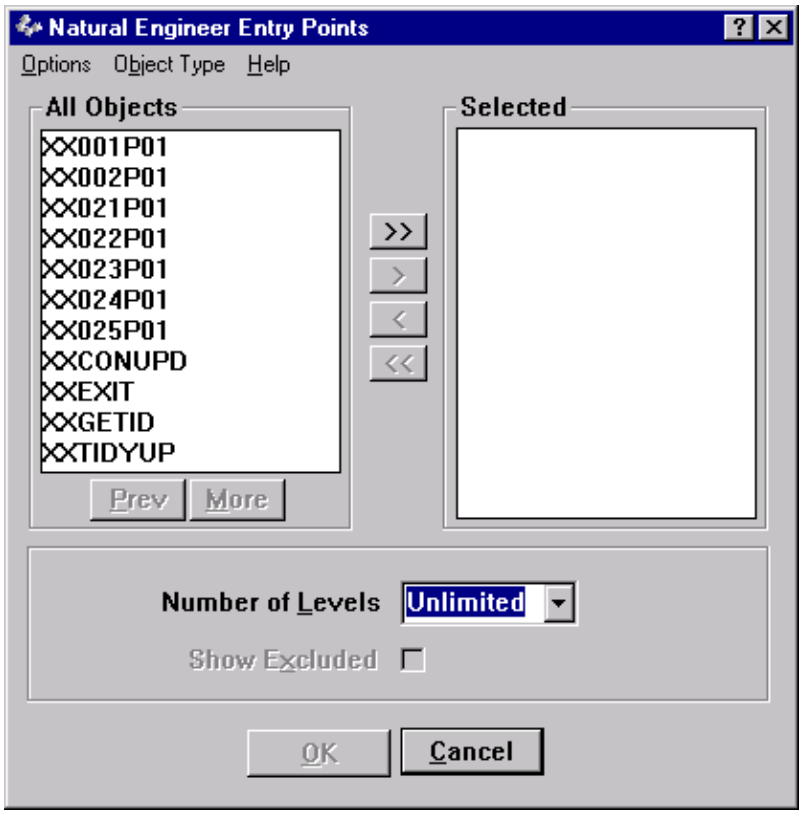


Figure 2-16 Entry Points screen

Step 2 Specify the Entry Point for the HOSPITAL system.

Select object **XX001P01** from the All Objects list box. Use the **[>]** button to select the object. This will add **XX001P01** to the Selected list box and remove it from the All Objects list box.

The following Figure 2-17 illustrates the Entry Points screen after object XX001P01 has been selected.

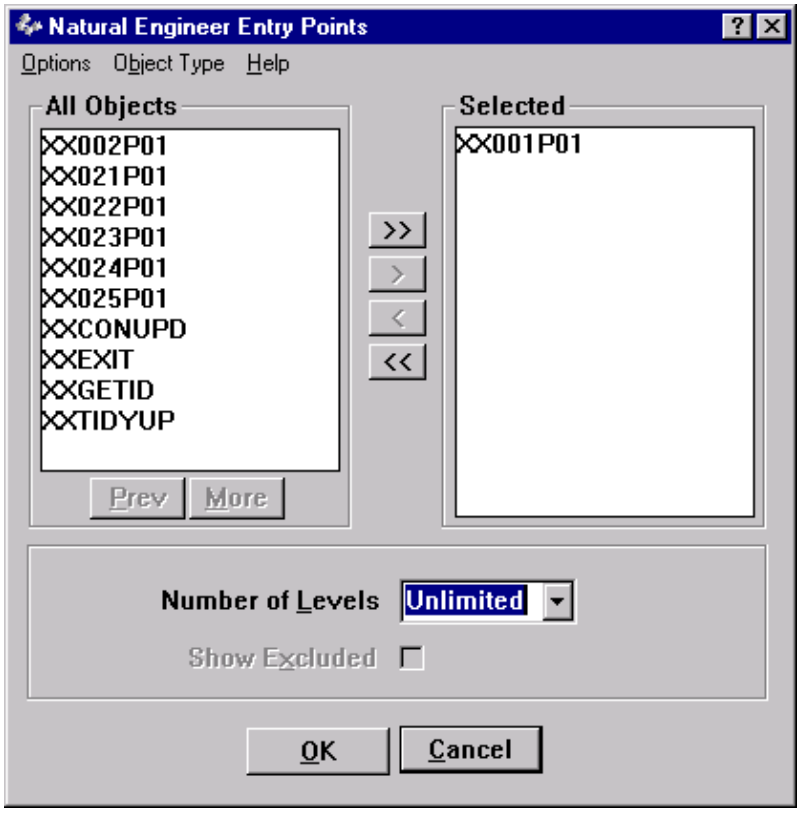


Figure 2-17 Entry Points screen after object XX001P01 has been selected

The number of levels is set to unlimited so that all entry point chains processed will be displayed. The Show excluded option is unavailable, as no exclusions have been set.

Step 3 View the Entry Point Structure Diagram.

Use the **OK** button on the Entry Points screen. This will produce the Entry Point Structure Diagram confirmation pop-up window.

The following Figure 2-18 illustrates the Entry Point Structure Diagram pop-up confirmation window.

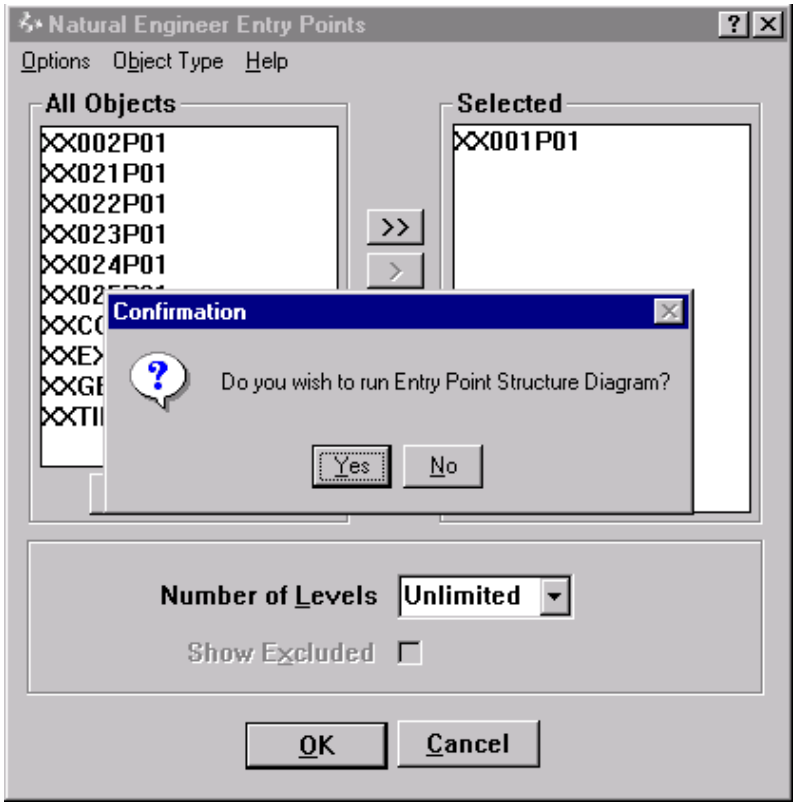


Figure 2-18 Entry Point Structure Diagram pop-up confirmation window

Step 4 Accept the confirmation.

Use the **Yes** button on the Entry Point Structure Diagram confirmation pop-up window to view the Entry Point Structure Diagram. This will invoke the GenTree Structure Analyser screen displaying the details for the HOSPITAL application.

The following Figure 2-19 illustrates the Entry Point Structure Diagram for the HOSPITAL application.

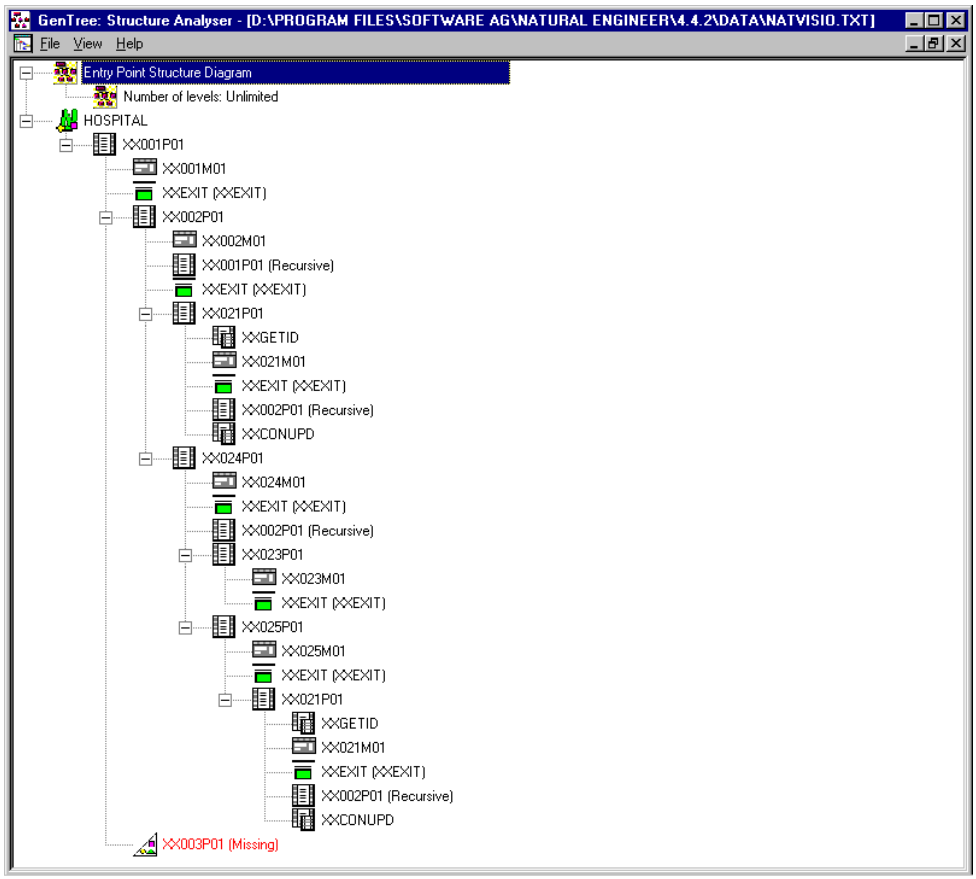


Figure 2-19 Entry Point Structure Diagram for the HOSPITAL application

At the top of the diagram all the entry point display options used for this example are displayed.

From the diagram we can see that there is one missing object: **XX003P01**. Also objects **XX001P01** and **XX002P01** are marked as 'Recursive' in some of the lower entry point chains as they have already been expanded once in the diagram.

Example 2: Add Entry Point Exclusions to the HOSPITAL Application.

This example will run through the steps required to produce the Entry Point Structure Diagram for the sample Natural application HOSPITAL using object name and object type exclusions.

Object name exclusion will be specified to exclude any objects prefixed by '**XX02**'. This will result in objects **XX021P01** and **XX024P01** being excluded.

Object type exclusion will be specified to exclude any objects that are of type '**Subroutine**'. This will result in object **XXEXIT** being excluded.

This example follows on from Example 1.

Step 1 Open the Entry Point Exclusion screen.

From the Entry Point Structure Diagram screen select menu Options➔Entry Point Exclusions. The Entry Point Exclusions screen will be presented.

The following Figure 2-20 illustrates the Entry Point Exclusions screen.

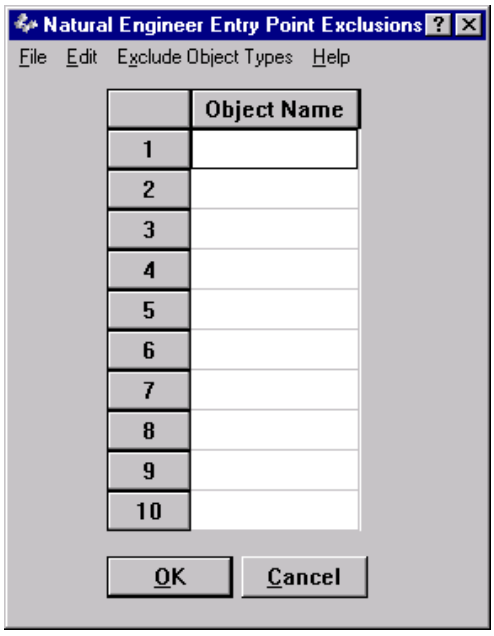


Figure 2-20 Entry Point Exclusions screen

Step 2 Specify the object name exclusion.

Enter object name = **XX02*** in Row 1. This will exclude any object in the HOSPITAL application that is prefixed with '**XX02**'.

The following Figure 2-21 illustrates the Entry Point Exclusion screen after object name XX02* has been specified.

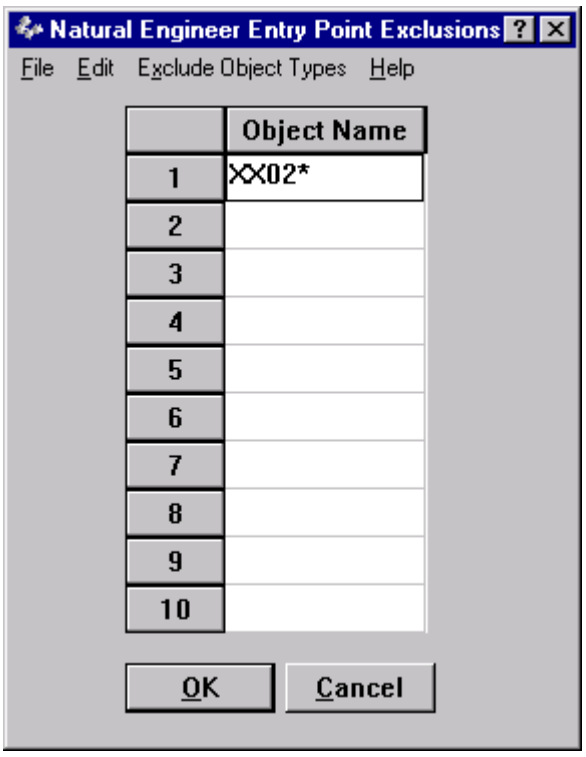


Figure 2-21 Entry Point Exclusions screen after object name XX02* has been specified

Step 3 Specify the object type exclusion.

Select the Exclude Object Types drop-menu from the Entry Point Exclusion screen and select the object type '**Subroutine**'.

The following Figure 2-22 illustrates the object type 'Subroutine' selection.

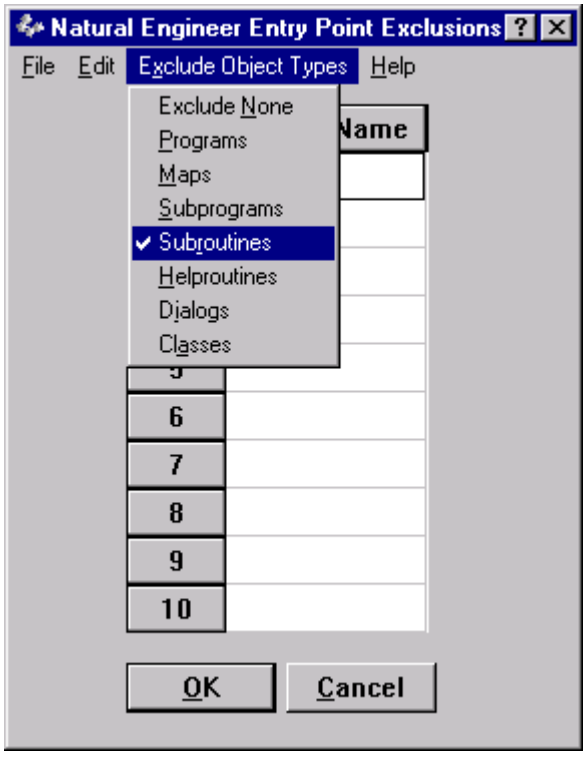


Figure 2-22 Object type 'Subroutine' selection

Step 4 Check the viewing refinement options.

Use the **OK** button on the Entry Point Exclusions screen. This returns you to the Entry Points screen. The Number of Levels will be set to '**Unlimited**'. The Show Excluded option is enabled due to the exclusions that have been set. This will be selected to show the excluded objects on the diagram.

The following Figure 2-23 illustrates the Entry Points screen showing the viewing refinement options.

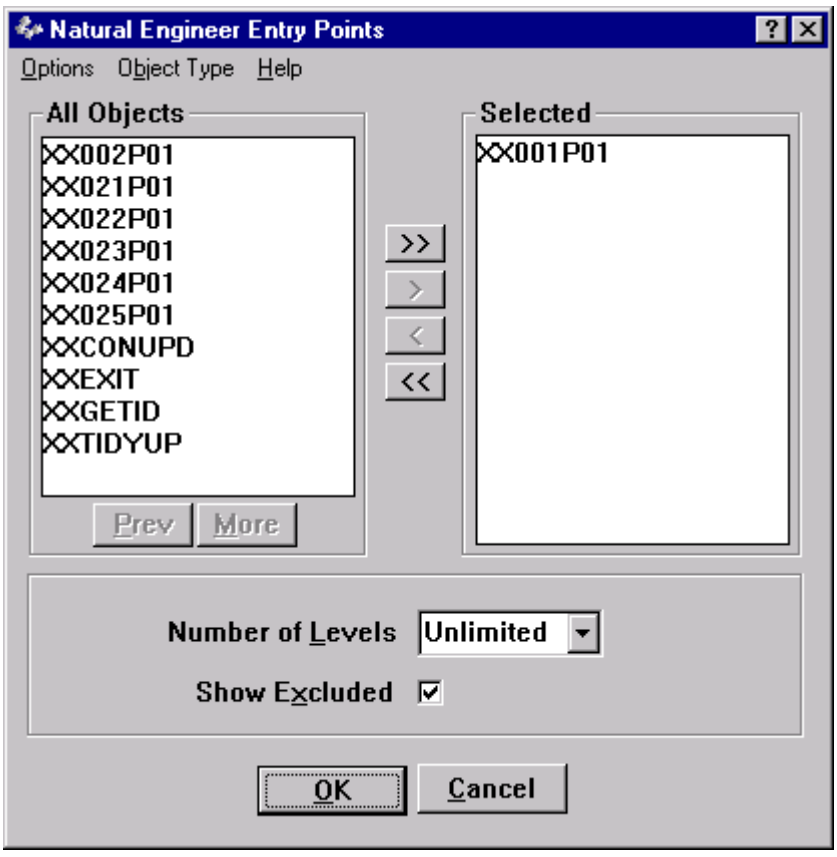


Figure 2-23 Entry Points screen viewing refinement options

Step 5 View the Entry Point Structure Diagram.

Use the **OK** button on the Entry Points screen. This will produce the Entry Point Structure Diagram confirmation pop-up window.

The following Figure 2-24 illustrates the Entry Point Structure Diagram pop-up confirmation window.

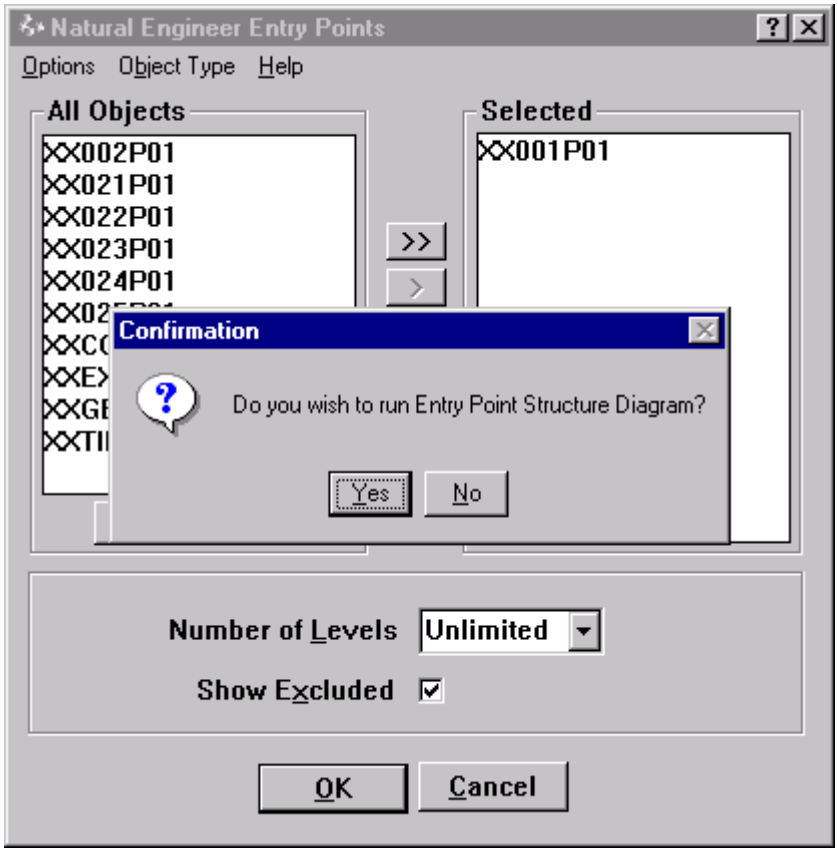


Figure 2-24 Entry Point Structure Diagram pop-up confirmation window

Step 6 Accept the confirmation.

Use the **Yes** button on the Entry Point Structure Diagram confirmation pop-up window to view the Entry Point Structure Diagram. This will invoke the GenTree Structure Analyser screen displaying the details for the HOSPITAL application.

The following Figure 2-25 illustrates the Entry Point Structure Diagram with exclusions for the HOSPITAL application.

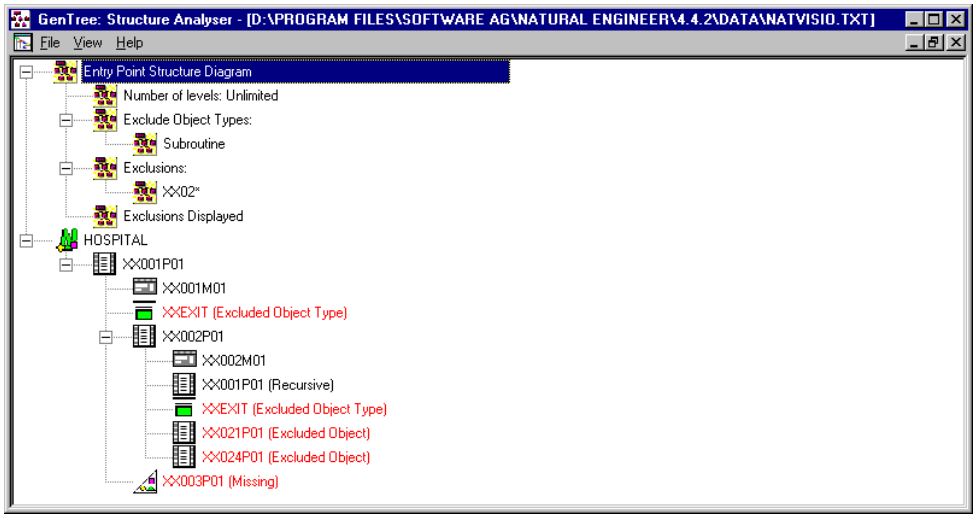


Figure 2-25 Entry Point Structure Diagram with exclusions for the HOSPITAL application

At the top of the diagram all the entry point display options used for this example are displayed.

From the diagram we can see that objects **XX021P01** and **XX024P01** are marked as 'Excluded Object' as they meet the exclusion object name mask of '**XX02***'. Similarly, the objects **XX023P01** and **XX025P01** are not showing because they are within the exclusion object, entry point chain.

The subroutine **XXEXIT** is marked as 'Excluded Object Type' as it meets the exclusion object type '**Subroutine**'.

Structure Flow Diagram

The Structure Flow Diagram option provides a mechanism to draw a structured diagram representing the relationships between objects, both those used by the object and those using the object.

The process is initiated by selecting an object within an application. All references of external objects are shown on the Structure Flow Diagram, these can include data areas, copycodes, maps, helproutines, programs, subprograms, external subroutines and dialogs. A link chain is used within the diagram to map the inter-object relationships.

The complexity of the diagram can be controlled by specifying the number of levels to be applied and/or specifying objects to be excluded.

The Structure Flow Diagrams are drawn and displayed using Microsoft Visio 2000. From the diagram it is possible to view the source code of any object on the diagram using GenSource. This is invoked by simply selecting any object on the diagram.

Note: For more information on GenSource refer to Chapter 2 in the Natural Engineer Reporting manual.

The diagrams can be printed and/or saved using the functions found within Microsoft Visio 2000, providing useful additional systems documentation that will complement existing systems specifications.

Structure Flow Diagram Control Options

There are three main controlling options that will determine the content and complexity of the Structure Flow Diagram produced for a selected object.

1. Type of Object Relationship

There are two types of object relationship available:

1. **Objects Referenced by the Object**

   This will start at the selected object and shows all the objects referenced by that object, and the objects referenced by those, and so on. This can be said to represent the 'Forward' relationship chain for an object

2. **Objects Referencing the Object**

   This will start at the selected object and shows all the objects referencing that object and any respective inter-object relationship links. This can be said to represent the 'Reverse' relationship chain for an object.

   Note: This relationship view will only show objects that issue calls to other objects, i.e., no data areas will be shown (unless they are the selected starting object).

2. The Number of Processing Levels

The number of processing levels will control the 'Forward' or 'Reverse' relationship chains for each object included in the diagram. The process is limited to a range of 1 to 9 levels.

To help illustrate this, the following 4 objects show their inter-object relationships within their source code.

PROG1	**PROG2**	**PROG3**	**PROG4**
::::	::::	::::	::::
0100 FETCH 'PROG2'	0100 FETCH 'PROG4'	0100 WRITE 'HELLO WORLD'	0100 FETCH 'PROG1'
::::	::::	::::	::::
0300 FETCH 'PROG3			
::::			

Using PROG1 as the starting object, the 4 objects have the following processing levels:

Level 0	PROG1
Level 1	PROG2 (called by PROG1) + PROG3 (called by PROG1)
Level 2	PROG4 (called by PROG2)

Based on this information, the Structure Flow Diagram content can be controlled by setting the number of levels.

The following Figure 2-26 illustrates the Structure Flow Diagram starting at object PROG1 with number of levels set to 1.

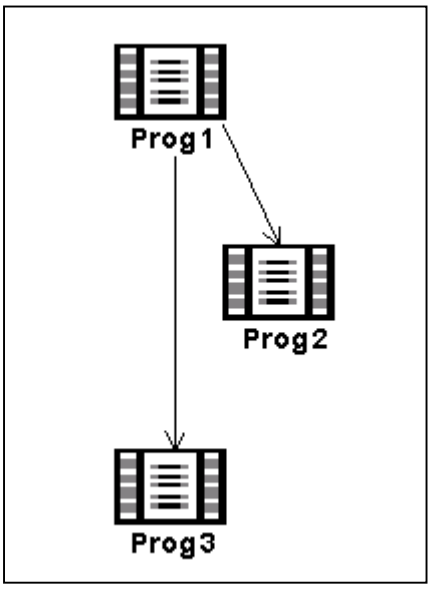


Figure 2-26 Structure Flow Diagram with number of levels set to 1

The Structure Flow Diagram shows the inter-object relationships between PROG1, PROG2 and PROG3. PROG4 is not shown as it is at the next processing level (level 2).

The following Figure 2-27 illustrates the Structure Flow Diagram starting at object PROG1 with number of levels set to 2.

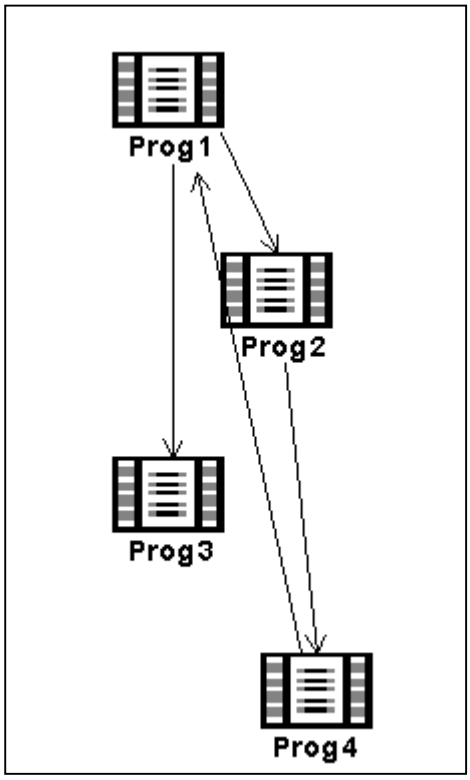


Figure 2-27 Structure Flow Diagram with number of levels set to 2

The Structure Flow Diagram shows the same inter-object relationships between PROG1, PROG2 and PROG3 as Figure 2-26. Additionally, PROG4 is now shown, which also includes the relationship between PROG4 and PROG1.

3. Excluding objects

Objects can be excluded from the Structure Flow Diagram to help reduce the complexity and remove any inter-object relationships that may not be of any interest for the diagram being requested.

The following Figure 2-28 illustrates the Structure Flow Diagram starting at object PROG1 with number of levels set to 2 and Object PROG2 marked as excluded.

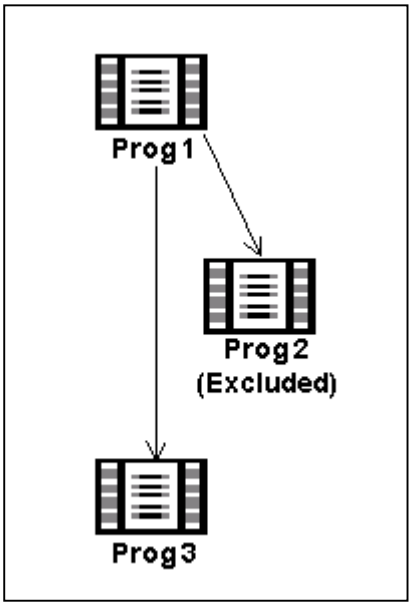


Figure 2-28 Structure Flow Diagram with object PROG2 marked as excluded

The Structure Flow Diagram does not show any processing levels from PROG2 as this has been marked for exclusion.

Note: For more information on excluding objects refer to section Structure Flow Diagram Exclusions later in this chapter.

Structure Flow Diagram Window

The Structure Flow diagram option can be accessed by the following menu navigation: Environment➔Object Explorer➔Structure Flow Diagram.

This will invoke the Structure Flow Diagram screen, which controls all the diagram selection options.

The following Figure 2-29 illustrates the Structure Flow Diagram screen.

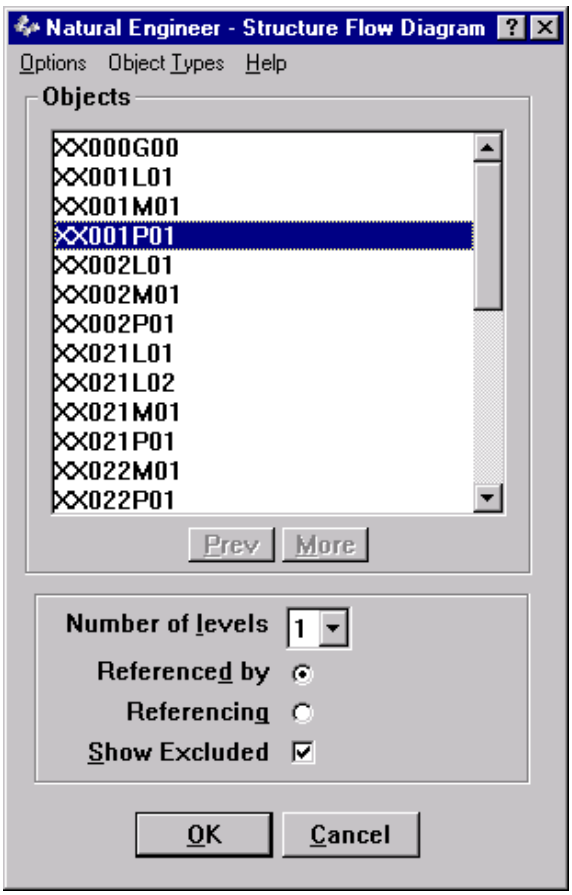


Figure 2-29 Structure Flow Diagram screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various Structure Flow Diagram handling options.	
	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	Entry Point Exclusions	This will invoke the Structure Flow Diagram Exclusions screen.
	Exit	Will close the Structure Flow Diagram screen and return you back to the main Natural Engineer screen.
Object Type	Allows you to select the object types to be listed. Valid object types are: ▪ **All Objects (default)** ▪ **Programs** ▪ **Maps** ▪ **Parameter Data Areas** ▪ **Global Data Areas** ▪ **Local Data Areas** ▪ **Copycodes** ▪ **Subprograms** ▪ **Subroutines** ▪ **Helproutines** ▪ **Dialogs**	
Help	Invokes the Structure Flow Diagram help.	

SCREEN ITEMS	DESCRIPTION
Object List	Lists the objects in the application that have been loaded into the Repository. The title at the top of the objects list box is dependent on the setting for object types; the default is 'Objects', when all object types are being displayed. For example: if object type were set to programs, the title would be 'Objects [Programs]' and only objects with object type of program will be displayed.
Number of levels	This will set the number of levels to be processed. Valid selections are 1 to 9.

SCREEN ITEMS	DESCRIPTION
Referenced by	This will produce a diagram displaying a forward relationship chain of all the objects being referenced starting from the selected object. The number of forward relationships is controlled by the Number of levels value. *Note: This option is not available for object types Global Data Areas, Local Data Areas and Parameter Data Areas.*
Referencing	This will produce a diagram displaying a reverse relationship chain of all the objects referencing the selected object and their respective inter-object relationship links. The number of reverse relationships is controlled by the Number of levels value.
Show Excluded	Controls the display of Structure Flow Diagram Exclusions. Valid selections in the check box are: '**Tick**' Will display the excluded object on the diagram but no further relationship chain information for that object will be displayed. The object will be marked as '(Excluded)'. ' ' The excluded object will not appear on the diagram. *Note: This option is only available if exclusions have been specified.*

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
OK	Microsoft Visio 2000 is invoked and the appropriate Structure Flow Diagram is drawn and displayed based on the selections made. *Note: This button is only active when an Object has been selected.*
Cancel	Will close the Structure Flow Diagram screen and return you back to the main Natural Engineer screen.

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Structure Flow Diagram Exclusions

It is possible to specify any objects you do not wish to have drawn and suppress subsequent levels of the relationship chain from the selected object by using the Structure Flow Diagram Exclusions screen.

This option allows you to tailor the diagrams to only show the relevant level of detail required. This prevents over crowded diagrams being produced when only a certain proportion of the relationship chain is required.

The Structure Flow Diagram Exclusion screen allows up to a maximum of 10 objects to be excluded from the diagram. Object names can be entered in full or using wildcard masks to identify groups of objects. For example:

1. **Exclusion object name =** '**XX021P01**' would result in object XX021P01 having no relationship chain being displayed for it.
2. **Exclusion object name =** '**PRT***' would result in all objects where their name is prefixed with PRT having no relationship chains displayed.

Structure Flow Diagram Exclusions Window

The Structure Flow Diagram Exclusions screen is accessed from the Options drop-menu on the Structure Flow Diagram screen, using Options➔Structure Flow Exclusions. When this option is selected, the Structure Flow Diagram Exclusions screen is displayed.

The following Figure 2-30 illustrates the Structure Flow Diagram Exclusions screen.

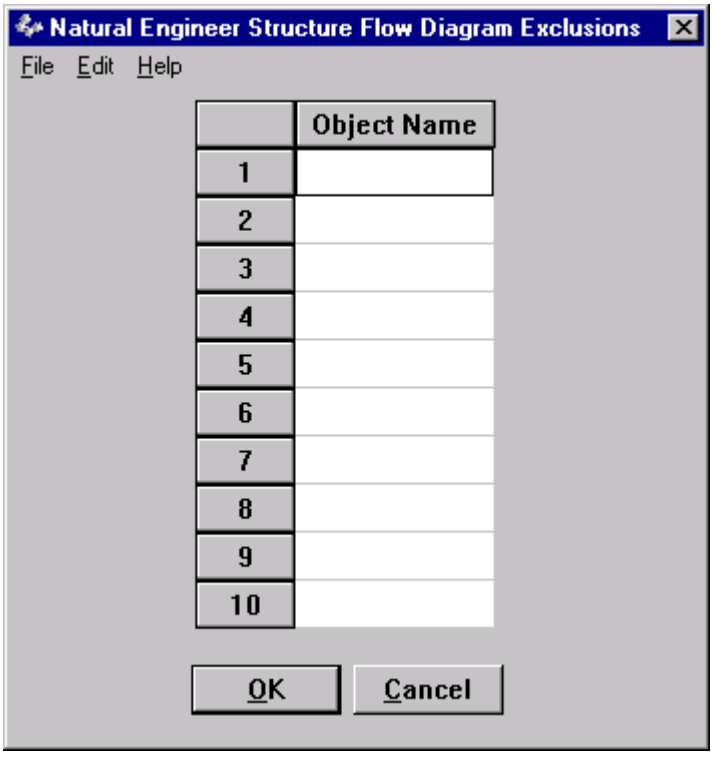


Figure 2-30 Structure Flow Diagram Exclusions screen

MENU ITEMS	OPTIONS	DESCRIPTION
File	**Exit**	Will close the Structure Flow Diagram Exclusion screen and return you back to the Structure Flow Diagram screen.
Edit	**Delete Row**	Will delete the selected object name from the object exclusion list.
Help	Invokes the Structure Flow Diagram Exclusions help.	

SCREEN ITEMS	DESCRIPTION	
Object Name	Objects to be marked for exclusion are specified here. Object names can be complete names or part names using a wildcard of '*' (asterisk). For example:	
	XX021P01	Will exclude object XX021P01.
	PRT*	Will exclude any objects whose name is prefixed with 'PRT'.

BUTTON NAME	DESCRIPTION
OK	Save the Structure Flow Diagram Exclusion selections and return to the Structure Flow Diagram screen.
Cancel	Will close the Structure Flow Diagram Exclusions screen and return you back to the Structure Flow Diagram screen.

The following Figure 2-31 illustrates the Structure Flow Diagram for object XX001P01 from the HOSPITAL system.

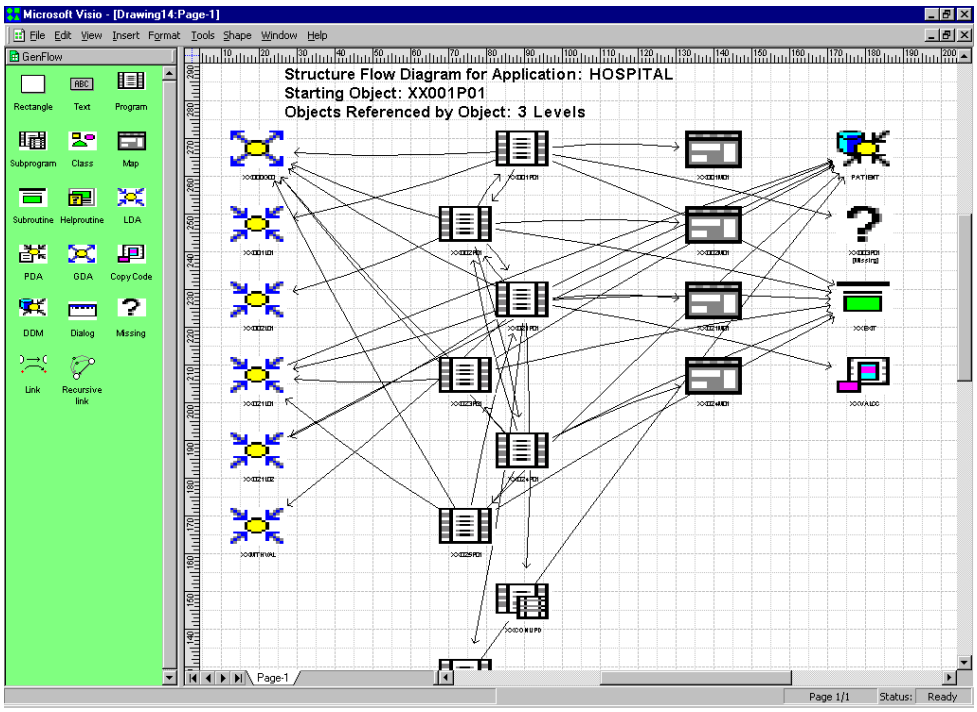


Figure 2-31 Structure Flow Diagram

The Structure Flow Diagram shows the objects referenced by object, starting from object XX001P01 for 3 levels. To the left of the diagram is the GenFlow.vss stencil showing all the shapes available for each object within a diagram.

The GenFlow.vss stencil can be located in the X:\PROGRAM FILES\SOFTWARE AG\NATURAL ENGINEER\4.4.2\DATA\VSD folder, where X: is the drive on which Natural Engineer has been installed.

The source code for an object can be viewed using GenSource, which is invoked by selecting any object on the diagram and using a double-click of the left-hand mouse button.

Note: For complex diagrams where link lines and object texts are difficult to distinguish, the diagrams can be re-organized by dragging and dropping selected objects.

Program Flow Logic Diagram

The Program Flow Logic Diagram option provides a mechanism to document the internal processing logic of an object in a structured diagram.

The diagrams produced can provide useful additional systems documentation that will complement existing systems specifications and can be viewed either on-line or as hardcopy by printing the diagrams.

The Program Flow Logic Diagram option uses the standards laid down by the Jackson Structured Programming technique (JSP) to handle the three main processing constructs within a programming object:

1. Sequential

Standard statements that can stand alone within an object. Examples of these would be:

MOVE #A TO #B

RESET #CALL-PROGRAM

MULTIPLY #NET-AMOUNT BY #TAX-RATE GIVING #GROSS-AMOUNT

2. Conditional

Conditional statements that will execute sequential statements based on the condition controlling them. Examples of these would be:

IF / END-IF AND IF / ELSE blocks

DECIDE ON FIRST/EVERY CONDITION

DECIDE FOR FIRST/EVERY VALUE

3. Iteration

Repeating statements that are in a controlled loop and execute until the loop control condition has been satisfied. Examples of these would be:

READ, FIND, HISTOGRAM

REPEAT WHILE / UNTIL

FOR /END-FOR statement blocks

The Program Flow Logic Diagrams are drawn and displayed using Microsoft Visio 2000. When the diagram has been completed, GenSource is activated to display the actual source code for the object alongside the diagram.

There is a Navigation link between the Program Flow Logic Diagram and the source code shown in GenSource, whereby selecting any box within the diagram will position at the respective source code within GenSource. Alternatively, selecting any source code line within GenSource will position you to the respective box within the Program Flow Logic Diagram. This assists in maintaining position within either a simple or complex diagram far more productive and makes the understanding of the logic flow easier to follow.

Note: For more information on GenSource refer to Chapter 2 in the Natural Engineer Reporting manual.

Within the Microsoft Visio 2000, a page can be found for the object that has been selected and drawn. The object name will be shown in a tab at the foot of the page. If the selected object uses any internal subroutines, then a page for each internal subroutine referenced will also be drawn. For these internal subroutines, the name placed in the tab will be the name referenced within the object.

Invoking Program Flow Logic Diagram

The Program Flow Logic Diagram option is accessed by using the following menu navigation: Environment➔Object Explorer➔Program Flow Logic Diagram.

This will invoke the Program Flow Logic Diagram object selection screen.

The following Figure 2-32 illustrates the Program Flow Logic Diagram object selection screen.

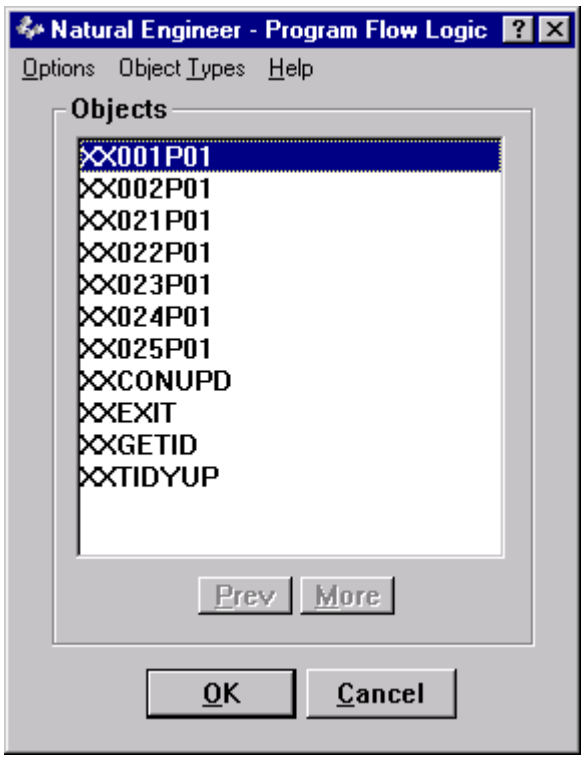


Figure 2-32 Program Flow Logic Diagram object selection screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	**Change Start Position of Object List**	Allows the Object List to be restarted from a particular object.
	Exit	Will close the Program Flow Logic Diagram object selection screen and return you back to the main Natural Engineer screen.
Object Types	**All Objects**	Will display all objects in the application.
	Programs	Will display objects of type Program only.
	Subprograms	Will display objects of type Subprogram only.
	Subroutines	Will display objects of type Subroutine only.
	Helproutines	Will display objects of type Helproutine only.
	Dialogs	Will display objects of type Dialog only.
Help		Invokes the Program Flow Logic Diagram help.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
OK	Invokes the Program Flow Logic Diagram process, launching the Create JSP progress status window.
Cancel	Will cancel the Program Flow Logic Diagram process and return back to the main Natural Engineer screen.

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Viewing the Program Flow Logic Diagram

Once an object has been selected from the Program Flow Logic object selection screen, Natural Engineer will proceed to invoke Microsoft Visio 2000. A progress status window will open to show how Natural Engineer is progressing in creating the diagram. Once completed, the diagram will appear as a page in Microsoft Visio 2000 and the source code for the object will be displayed in a GenSource window.

The following Figure 2-33 illustrates the Create JSP Progress status window.

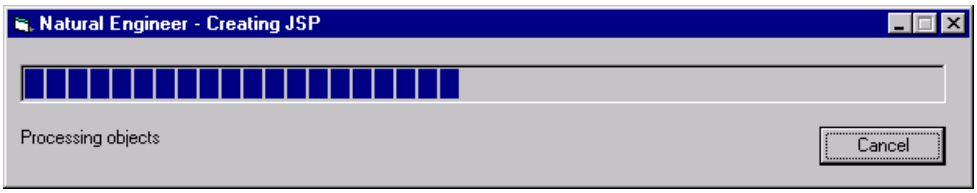


Figure 2-33 Create JSP Progress status window

SCREEN ITEMS	DESCRIPTION
Progress Bar	Progress is shown using a block progress bar.

BUTTON NAME	DESCRIPTION
Cancel	Will cancel the Program Flow Logic Diagram process and return back to the main Natural Engineer screen.

The following Figure 2-34 illustrates the completed Program Flow Logic Diagram in Microsoft Visio 2000 and the source code in GenSource window.

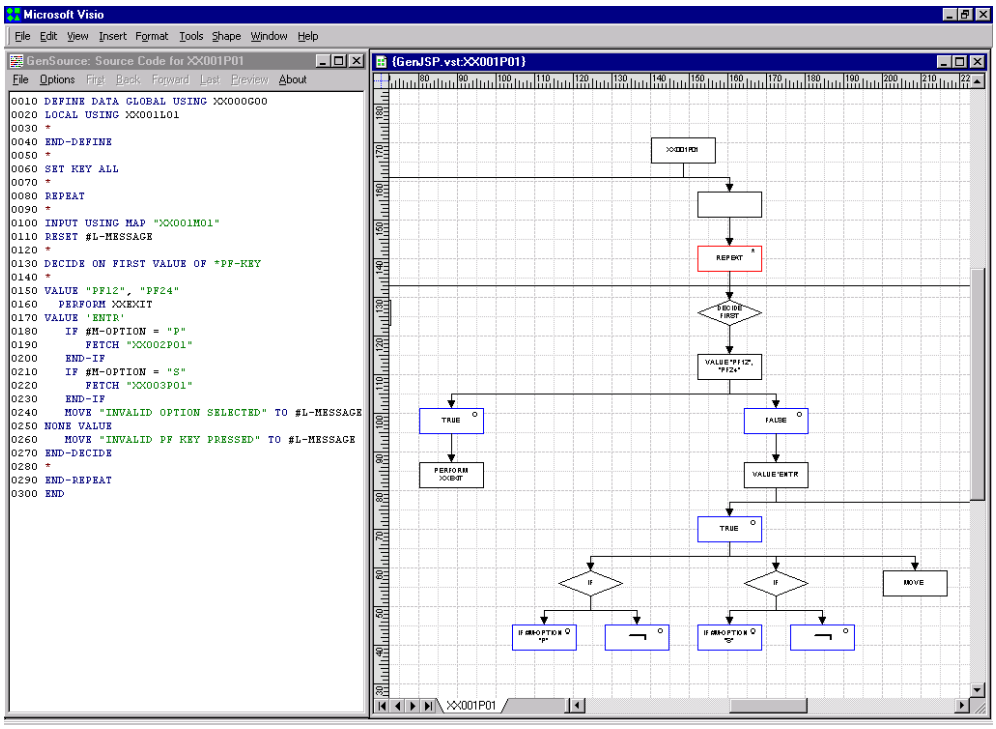


Figure 2-34 Completed Program Flow Logic Diagram and GenSource window

Stencils and Shapes

The Program Flow Logic Diagram is drawn in Microsoft Visio 2000 using the shapes found in the GenJSP.vss stencil. This can be located in the X:\PROGRAM FILES\SOFTWARE AG\NATURAL ENGINEER\4.4.2\DATA\VSD folder, where X: is the drive on which Natural Engineer has been installed.

Each shape depicts the JSP standard representation for the main processing constructs within a programming object.

The following describes the shapes used based on the three main processing constructs.

1. Sequential

Sequential statements that can stand alone within an object use a rectangle shape.

Example statement:

MOVE #A TO #B

The following Figure 2-35 illustrates the shape used for sequential code.

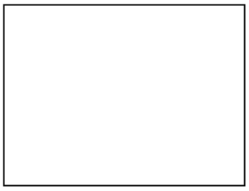


Figure 2-35 Shape for sequential code

2. Conditional

Conditional statements will execute sequential statements based on the condition controlling them. These will use a series of shapes to show the conditional statement and the conditional branches (TRUE for when the condition has been matched and FALSE for when the condition has not been matched). A diamond shape is used for the conditional statement. A blue rectangle shape is shown for the TRUE branch and a blue rectangle shape with a logical not symbol (¬) is shown for the FALSE branch. Both blue rectangles will have a circle in top right hand corner.

Example statements:

IF #OPTION = 1

DECIDE ON FIRST VALUE OF #OPTION

The following Figure 2-36 illustrates the shape used for the conditional statement.

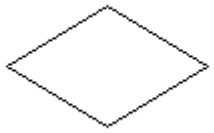


Figure 2-36 Shape for conditional statement

The following Figure 2-37 illustrates the shape used for the TRUE branch of a conditional statement.

Figure 2-37 Shape for TRUE branch of a conditional statement

The following Figure 2-38 illustrates the shape used for the FALSE branch of a conditional statement.

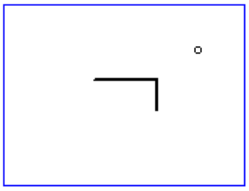


Figure 2-38 Shape for FALSE branch of a conditional statement

3. Iteration

Repeating statements that are in a controlled loop use a red rectangle and will have an asterisk in top right hand corner.

Example statements:

REPEAT UNTIL #INDEX GT 99

READ EMPLOYEES

FOR #LOOP-START EQ 1 TO 10

The following Figure 2-39 illustrates the shape used for iteration statements.

Figure 2-39 Shape for iteration statements

3

APPLICATION METRICS

Chapter Overview

This chapter describes the various options available under the Application Metrics option found on the Environment menu.

The Application Metrics option provides summary and detailed information about the application, objects and source code, for the purpose of providing structural statistics and quality information.

The Application Metrics option is accessed using the following menu navigation: Environment➔Application Metrics.

This chapter covers the following Application Metrics sub options:

1. **Interactive**

This option allows you to interrogate each object within an application by selecting pre-defined classifications to report on the usage of various Natural statements and keywords, showing a count of the number of occurrences within an object. The measurements are categorized by quality, reliability and maintenance.

2. **Graphics**

This option provides graphed measurement reports on the object types, sizes and usage within an application.

3. **Reports**

This option provides textual measurement reports on object quality, reliability and maintainability. Object complexities are reported using industry standard complexity measurements such as Halstead and McCabe.

Interactive

The Application Metrics Interactive option provides an on-line method of interrogating individual objects within an application on various Natural statements and keywords for different classifications.

A classification groups a set of particular Natural statements and keywords into logical groups such as Definitions, I/O, Flow Control etc. By selecting the classification required, the number of occurrences found and the actual Natural statements are displayed on the screen.

The Application Metrics Interactive option is accessed using the following menu navigation: Environment➔Application Metrics➔Interactive.

This provides a sub-menu with the following options:

1. Object Quality
2. Object Reliability
3. Object Maintenance

Object Quality

The Object Quality option is accessed using the following menu navigation: Environment ➔Application Metrics➔Interactive➔Object Quality.

The objects that are loaded into the Repository for the currently selected application are listed in a selection box.

By selecting an object and choosing an option from one of the classifications available, the number of occurrences for the selection is shown along with the Natural statements (if applicable) in the details list box.

The following Figure 3-1 illustrates the Application Metrics Interactive Object Quality screen.

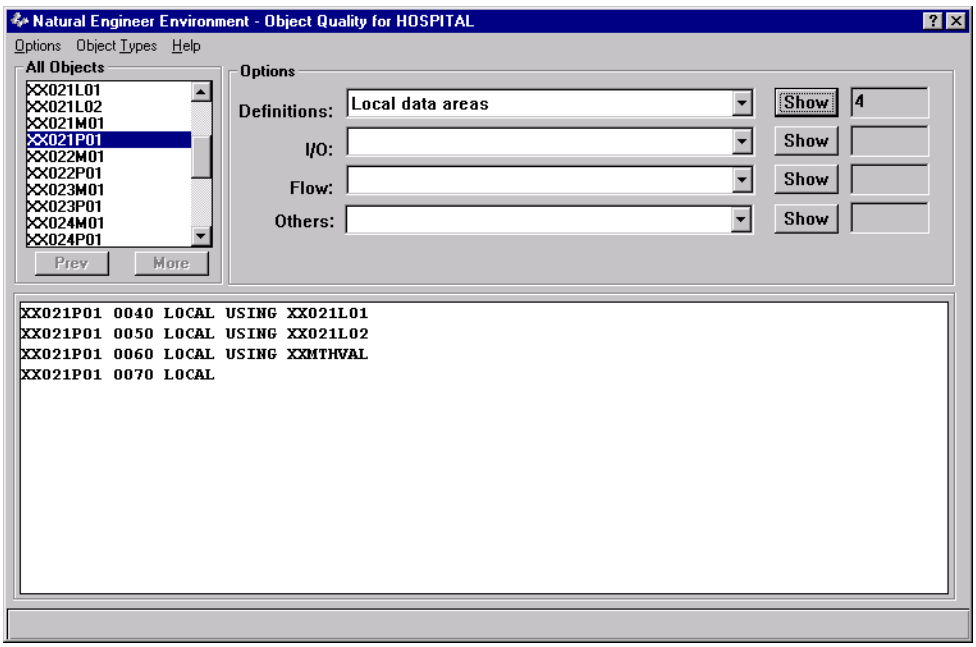


Figure 3-1 Application Metrics Interactive Object Quality screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various sub-options.	
	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	View Source Code	Allows display of the source code of the selected object using the preferred browser.
	Edit Object	Allows the selected object to be opened in the appropriate Natural Editor.
	Close	Will close the Object Quality screen and return you back to the main Natural Engineer screen.
Object Types	Allows you to select the Object Types to be listed. Available selections are: ▪ **All objects** ▪ **Programs** ▪ **Maps** ▪ **Data Defn. Modules** ▪ **Parameter Data Areas** ▪ **Global Data Areas** ▪ **Local Data Areas** ▪ **Copycodes** ▪ **Subprograms** ▪ **Subroutines** ▪ **Helproutines** ▪ **Dialogs** ▪ **Classes**	
Help	Invokes the Object Quality help.	

SCREEN ITEMS	DESCRIPTION
Objects	Lists all the objects in the application that have been loaded into the Repository. This list can be tailored to your requirements using the options in the Object Types menu. It is possible to navigate between the Object Quality screen and the Object Reliability or Object Maintenance screens by using the **right hand mouse button** on a selected object.
Options	This will contain the classification options that are available in selection boxes. The classifications available are: ▪ **Definitions** ▪ **I/O** ▪ **Flow** ▪ **Others** *Note: The classification options are detailed in the Object Quality classification options section below.*
Details	This list box will display any relevant details from the Object Quality selection. If no details are available, then an appropriate message is displayed here.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
SHOW	Each classification option will have its own SHOW button. Using this button will invoke the processing for the option selected, the results will show the count to the right of the SHOW button and any relevant details will be displayed in the display box. *Note: The SHOW buttons are mutually exclusive, each use will refresh the count and display. Previous counts and options are not cleared.*

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Object Quality Classification Options

The following table lists the classification options available:

Classification	Option	Relationship in Object Code
Definitions	**Define work file**	DEFINE WORK FILE
	Define printer	DEFINE PRINTER
	Define window	DEFINE WINDOW
	Global data areas	DEFINE DATA GLOBAL
	Local data areas	DEFINE DATA LOCAL
	Parameter data areas	DEFINE DATA PARAMETER
	Simple data items	Level 1 no view, no array.
	Blocks	Block usage within a GDA.
	Arrays	Array definition for the Data Item.
	Structures	Level 1, no format, view or array.
	Views	View of a DDM.
	Initial values	INIT, CONST
	Defined edit masks	Edit masks used.
	Redefines	REDEFINE
	Compile time settings	DEFINE PRINTER DEFINE WORKFILE DEFINE WINDOW DEFINE REPORT REDEFINE FORMAT INCLUDE LIMIT OBTAIN OPTIONS PASSW SET GLOBALS WRITE TITLE WRITE TRAILER DEFINE SUBROUTINE

Classification	Option	Relationship in Object Code
I/O	**Database statements**	DELETE FIND GET STORE HISTOGRAM READ SELECT UPDATE
	Workfile I/O	READ WORK WRITE WORK CLOSE WORK
	Terminal/Printer I/O	OPEN PRINTER CLOSE PRINTER DISPLAY DRAW EJECT INPUT INPUT MARK INPUT WINDOW NEWPAGE PLOT PRINT SKIP REINPUT WRITE
Flow	**Flow control**	ACCEPT REJECT ESCAPE ESCAPE BOTTOM ESCAPE ROUTINE ESCAPE TOP DECIDE IF PERFORM BREAK REPEAT DECIDE VALUE, DECIDE VALUE NONE DECIDE VALUE ANY DECIDE VALUE ALL DECIDE WHEN DECIDE WHEN NONE DECIDE WHEN ANY DECIDE WHEN ALL

Classification	Option	Relationship in Object Code
	Flow modification	ACCEPT REJECT ESCAPE STOP TERMINATE RETRY
	External module access	CALL CALL FILE CALL LOOP CALLNAT FETCH PROCESS STACK
	Non procedural block definitions	AT BREAK OF AT START OF DATA AT END OF DATA AT TOP OF PAGE AT END OF PAGE BEFORE BREAK DEFINE SUBROUTINE ON ERROR
Others	**Arithmetic & string manipulation**	ADD ASSIGN COMPRESS COMPUTE DIVIDE EXAMINE MOVE MOVE EDITED MOVE BY NAME MOVE BY POSITION MULTIPLY RESET SEPARATE SUBTRACT
	Transaction control	BACKOUT TRANSACTION END TRANSACTION OPEN CONVERSATION CLOSE CONVERSATION

Classification	Option	Relationship in Object Code
	Run time settings	RELEASE RELEASE SETS RELEASE STACK RELEASE VARIABLES SET KEY SET CONTROL SETTIME SET WINDOW STACK SUSPEND IDENTICAL

Object Reliability

The Object Reliability option is accessed using the following menu navigation: Environment➔Application Metrics➔Interactive➔Object Reliability.

The objects that are loaded into the Repository for the currently selected application are listed in a selection box.

By selecting an object and choosing an option from one of the classifications available, the number of occurrences for the selection is shown along with the Natural statements (if applicable) in the details list box.

The following Figure 3-2 illustrates the Application Metrics Interactive Object Reliability screen.

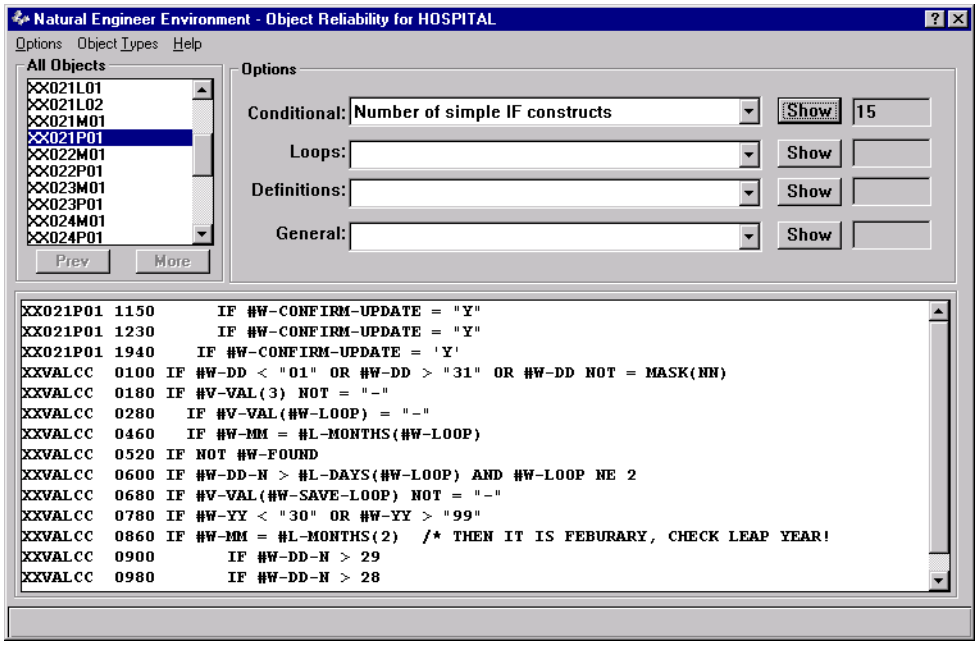


Figure 3-2 Application Metrics Interactive Object Reliability screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various sub-options.	
	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	View Source Code	Allows display of the source code of the selected object using the preferred browser.
	Edit Object	Allows the selected object to be opened in the appropriate Natural Editor.
	Close	Will close the Object Reliability screen and return you back to the main Natural Engineer screen.
Object Types	Allows you to select the Object Types to be listed. Available selections are: ▪ **All objects** ▪ **Programs** ▪ **Maps** ▪ **Data Defn. Modules** ▪ **Parameter Data Areas** ▪ **Global Data Areas** ▪ **Local Data Areas** ▪ **Copycodes** ▪ **Subprograms** ▪ **Subroutines** ▪ **Helproutines** ▪ **Dialogs** ▪ **Classes**	
Help	Invokes the Object Reliability help.	

SCREEN ITEMS	DESCRIPTION
Objects	Lists all the objects in the application that have been loaded into the Repository. This list can be tailored to your requirements using the options in the Object Types menu. It is possible to navigate between the Object Reliability screen and the Object Quality or Object Maintenance screens by using the **right hand mouse button** on a selected object.
Options	This will contain the classification options that are available in selection boxes. The classifications available are: ▪ **Conditional** ▪ **Loops** ▪ **Definitions** ▪ **General** *Note: The classification options are detailed in the Object Reliability classification options section below.*
Details	This list box will display any relevant details from the Object Reliability selection. If no details are available, then an appropriate message is displayed here.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
SHOW	Each classification option will have its own SHOW button. Using this button will invoke the processing for the option selected, the results will show the count to the right of the SHOW button and any relevant details will be displayed in the display box. *Note: The SHOW buttons are mutually exclusive, each use will refresh the count and display. Previous counts and options are not cleared.*

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Object Reliability Classification Options

The following table lists the classification options available:

Classification	Option
Conditional	Number of simple IF constructs.
	Maximum statements for IF construct.
	Average statements for IF constructs.
	Number of IF/ELSE constructs.
	Maximum statements for IF/ELSE construct.
	Average statements for IF/ELSE constructs.
	Number of DECIDE constructs.
	Maximum statements for DECIDE constructs.
	Average statements for DECIDE constructs.
	Maximum statements for WHEN constructs.
	Average statements for WHEN constructs.
	Maximum statements for VALUE constructs.
	Average statements for VALUE constructs.
	Maximum number of nested conditions.
	Number of conditional blocks without DO/DOEND.
Loops	Number of FOR loops.
	Number of REPEAT loops.
	Number of CALL LOOP loops.
	Number of READ loops.
	Number of FIND loops.
	Number of HISTOGRAM loops.
	Number of CALL FILE loops.
	Number of SORT statements.
	Number of READ WORK FILE loops.
	Number of SELECT statements.

Classification	Option
	Total number of loops.
	Number of internal subroutines.
	Number of internal subroutines not referenced.
	Number of internal subroutines.
	Number of loop exit points.
	Number of loop end points.
	Number of loops closed implicitly.
Definitions	Number of data items in structures.
	Average number of data items in structures.
	Number of data items in arrays.
	Average number of data items in arrays.
	Number of arrays.
	Number of structures containing arrays.
	Number of fixed dimension arrays.
	Number of variable dimension arrays.
	Number of system variables used.
	Number of undefined variables.
	Number of variables not used.
	Number of dynamic variables.
	Number of *NUMBER/*COUNTER without reference.
	Number of database data items without reference.
General	Number of statements spanning one line.
	Maximum number of keywords per line.
	Average number of keywords per line.
	Number of STACK statements.
	Number of lines of code not used.

Object Maintenance

This option opens a dialog that allows for viewing of different types of coding in an object.

The Object Maintenance option is accessed using the following menu navigation: Environment➔Application Metrics➔Interactive➔Object Maintenance.

The objects that are loaded into the Repository for the currently selected application are listed in a selection box.

By selecting an object and choosing an option from one of the classifications available, the number of occurrences for the selection is shown along with the Natural statements (if applicable) in the details list box.

The following Figure 3-3 illustrates the Application Metrics Interactive Object Maintenance screen.

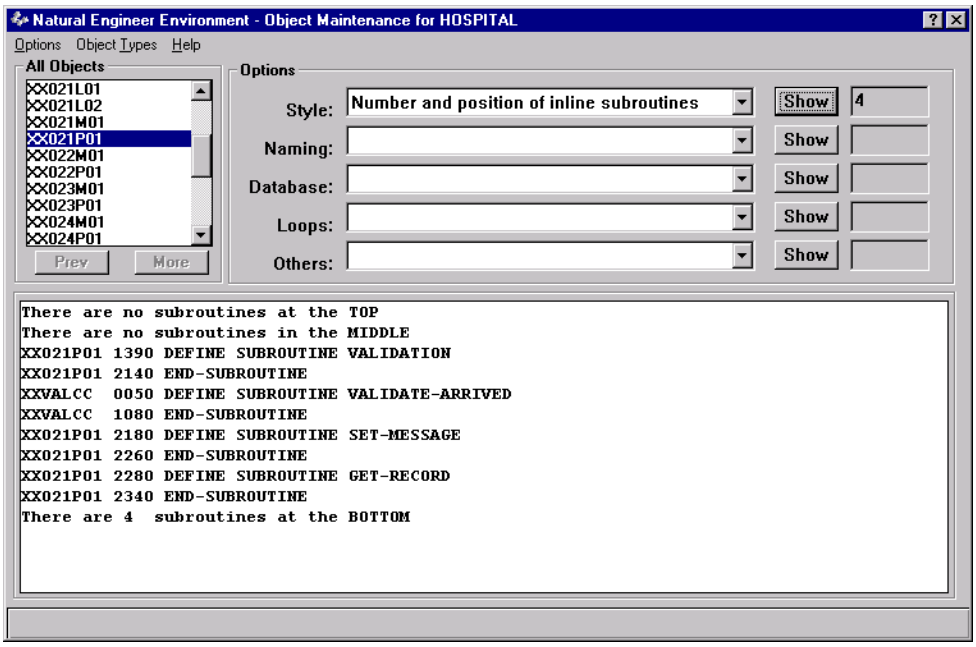


Figure 3-3 Application Metrics Interactive Object Maintenance screen

MENU ITEMS	OPTIONS	DESCRIPTION
Options	Provides various sub-options.	
	Change Start Position of Object List	Allows the Object List to be restarted from a particular object.
	View Source Code	Allows display of the source code of the selected object using the preferred browser.
	Edit Object	Allows the selected object to be opened in the appropriate Natural Editor.
	Close	Will close the Object Maintenance screen and return you back to the main Natural Engineer screen.
Object Types	Allows you to select the Object Types to be listed. Available selections are: ▪ **All objects** ▪ **Programs** ▪ **Maps** ▪ **Data Defn. Modules** ▪ **Parameter Data Areas** ▪ **Global Data Areas** ▪ **Local Data Areas** ▪ **Copycodes** ▪ **Subprograms** ▪ **Subroutines** ▪ **Helproutines** ▪ **Dialogs** ▪ **Classes**	
Help	Invokes the Object Maintenance help.	

SCREEN ITEMS	DESCRIPTION
Objects	Lists all the objects in the application that have been loaded into the Repository. This list can be tailored to your requirements using the options in the Object Types menu. It is possible to navigate between the Object Maintenance screen and the Object Quality or Object Reliability screens by using the **right hand mouse button** on a selected object.
Options	This will contain the classification options that are available in selection boxes. The classifications available are: ▪ **Style** ▪ **Naming** ▪ **Database** ▪ **Loops** ▪ **Others** *Note: The classification options are detailed in the Object Maintenance classification options section below.*
Details	This list box will display any relevant details from the Object Maintenance selection. If no details are available, then an appropriate message is displayed here.

BUTTON NAME	DESCRIPTION
Prev	Scrolls the object list to previous page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
More	Scrolls the object list forward one page. This button will be available/unavailable depending on the value specified in the LISTBOXMAX parameter in the NATENG.INI file.
SHOW	Each classification option will have its own SHOW button. Using this button will invoke the processing for the option selected, the results will show the count to the right of the SHOW button and any relevant details will be displayed in the display box. *Note: The SHOW buttons are mutually exclusive, each use will refresh the count and display. Previous counts and options are not cleared.*

Note: For more information on the NATENG.INI file parameter LISTBOXMAX refer to Chapter 1 in the Natural Engineer Administration Guide for Windows manual.

Object Maintenance Classification Options

The following table lists the classification options available:

Classification	Option
Style	Programming mode.
	Lines with more than 1 statement.
	Lines with incorrect indentation.
	Number of inline maps.
	Number and position of inline subroutines.
	Number of Redefines.
	Number of unused data items.
	Number of included copycode without parameters.
	Number of included copycode with parameters.
	Number of comment lines.
	Number of in-line comments.
	Number of lines of code commented out.
	Number of blocks of comment code.
	Average lines of code in each comment block.
	Show object maintenance log.
Naming	Data items with length N.
	Subroutine names with length N.
	Number of DDM data items without line, label.
	Number of call statements with variable name.
	Number of data items in object.
	Number of data items starting with #.
	Qualifier names with length N.
Database	Number of database statements.
	READ
	FIND

Classification	Option
	STORE
	DELETE
	UPDATE
	GET
	HISTOGRAM
	Number of database accesses to file numbers.
	Number of Adabas short names used.
Loops	Database statements.
	Number of loops only containing arithmetic statements.
	Maximum number of nested loops.
	EXAMINE
	SEPARATE
	COMPRESS
	SUBSTRING
Others	Number of internal subroutine calls.
	Number of external subroutine calls.
	Number of AIVs.
	Usage of implicit common data areas.
	Number of statements not allowed in structured mode.
	Number of system variables.
	Number of SET CONTROL usage.
	Number of SAG routines.
	Number of calls to external routines.
	Usage of undocumented routines e.g. CM*.

Graphics

The Application Metrics Graphics option will produce graphed reports using MS Excel to show various measurement information on the objects within an application.

The Application Metrics Graphics option is accessed using the following menu navigation: Environment➔Application Metrics➔Graphics.

There are three types of report available:

1. **Object Type Summary**

The Object Type Summary graphed report will display the number of objects per object type being used within an application.

2. **Object Size**

The Object Size graphed report will display the number of objects within specified object size ranges within an application.

3. **Object Usage**

The Object Usage graphed report will display the number of times objects are referenced within an application.

Note: For more information on the Application Metrics Graphics reports refer to Chapter 2 in the Natural Engineer Reporting manual.

Reports

The Application Metrics Reports option will produce textual reports to show various types of measurement information on the objects within an application.

The Application Metrics Reports option is accessed using the following menu navigation: Environment➔Application Metrics➔Reports.

There are six types of report available:

1. **Object Statistics**

The Object Statistics report provides summary and detailed information about the application, objects and code, for the purpose of providing structural statistics e.g., Halstead and McCabe.

2. **Object Quality**

The Object Quality report provides information on the quality of an object.

3. **Object Reliability**

The Object Reliability report provides information on the reliability of an object.

4. **Object Maintenance**

The Object Maintenance report provides information on the maintainability of an object.

5. **Object Quality Summary**

The Object Quality Summary report shows a calculated value for an object's quality, against specified metrics.

6. **Object Reliability Summary**

The Object Reliability Summary report shows a calculated value for an object's reliability, against specified metrics.

Note: For more information on the Application Metrics reports refer to Chapter 3 in the Natural Engineer Reporting manual.

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